CENTENARY HISTORY

OF THE

ZOOLOGICAL SOCIETY OF LONDON

BY

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With a Statistical Chart, 32 Portraits, and 9 Plans.

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Errata.

P. viii, line 4 from foot. *For* "P.G.M." *read* "P.C.M."

P. 111, line 13 from foot. *For* "Frederick" *read* "Francis."

P. 113, line 19 from top. *For* "1829" *read* "1830."

P. 226, line 15 from top. *For* "no" *read* "any."

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PREFACE

THE Zoological Society of London is a scientific institution, its differentia, in the logical phrase, being concern with living animals. It would have been impossible, in this volume, to recite the species we have exhibited in our century of existence, giving the dates of their first importation, and discussing the names and changes of name to which they have been subjected by systematists and dealers. That task, which is of practical and scientific importance, has been carried out by Major Stanley Flower, Dr. Carmichael Low, Dr. Malcolm Smith, Mr. E. G. Boulenger and Mr. J. R. Norman, and the results of their labours are about to appear in the three volumes of a "List of the Vertebrated Animals exhibited in the Gardens of the Zoological Society of London, 1828–1928." I have tried to deal with the various arrangements that have been made for their exhibition from time to time in accordance with the varying conceptions of the conditions most suitable to the animals themselves and to the public who support the Society by paying to see them. I have written at greater length regarding the last twenty-five years, partly because I have personal knowledge of that period, and still more because within it there have been great advances in knowledge of hygiene.

Our Charter has thrown on the Society the duty not only of introducing "new and curious subjects of the Animal Kingdom" but of the "advancement of Zoology and Animal Physiology." A century ago, Physiology had a more general connotation and implied less the laboratory investigations of to-day than the study of breeding, acclimatisation and the influence of surrounding conditions on living animals. It was in that sense it was understood by Sir Humphry Davy, whose influence in moulding the objects of the Society

cannot be over-estimated and has generally been under-estimated. It is in that sense that the Society has tried to carry out its functions.

The Society has advanced Zoology not only by maintaining the Zoological Gardens but by providing materials for Museums and anatomists, by forming one of the most catholic zoological libraries in the world, by publishing at great cost an enormous body of the results of zoological research, and by maintaining and assisting research in anatomy and taxonomy. It may interest some of those who visit Regent's Park to feed the bears or to watch the sea-lions diving to know that their subscriptions or entry money not only support the Gardens as an exhibition of animals but the Society as an organ of scientific research. It is, I think, worthy of note that, although this Society has become, in a sense, a national institution, it has neither asked for nor received any grants from any public funds, and that it pays rent, rates and taxes.

In preparing the History, I have had the advantage, by the courtesy of the Royal and Linnean Societies, of consulting their early Minutes. For the rest I have depended on the Minute Books and early documents preserved in our own Library. These were previously consulted, but I think, not very diligently, by Henry Scherren, in whose 1905 volume, " The Zoological Society of London " (Cassell and Company, 1905), I have found much interesting information.

There are a few omissions from the portraits of past officers which I had hoped to make complete. I have been unable to trace the existence of any photograph or engraving of James Morrison, Treasurer in 1830, or of Edward T. Bennett, Secretary from 1833 to 1836, or of William Ogilby, Secretary from 1840 to 1847. There is an oil painting of the Rev. John Barlow, Secretary, 1838 to 1840, in the Royal Institution, but the very slight interest he seems to have taken in his duties was insufficient to justify the reproduction of it.

To my great regret my friend, Mr. W. L. Sclater, Secretary in the early months of 1903, asked me to leave out his photograph.

I have pleasure in thanking various relatives of past Officers, and the existing Officers, for very kindly lending me engravings or photographs for reproduction. I am indebted to my private Secretary, Miss G. E. Gay, for drawing the Chart of Progress and one of the Plans, to "Geographia," Ltd., for preparing, on a uniform scale, the Plans of the Gardens from illustrations in various Garden Guides, and to Mr. R. B. Brook-Greaves for preparing the Plan of Whipsnade Park from a rough pencil sketch.

P. CHALMERS MITCHELL.

Zoological Society,
Regent's Park,
London, N.W.
April 15, 1929.

Chapter I.

FOUNDATION.

The Council chose 1929 for the celebration of the Centenary of the Zoological Society of London, which was incorporated by Royal Charter in 1829 and thus acquired legal status. But the Society had a previous existence. Its earliest history is obscure and rests as much on inference as on records, for no single person seems to have been at the pains to preserve the first memories of a movement which might have come to nothing. From 1826 onwards, however, the ground is secure, as the Minutes of the General Meetings and of the Meetings of Council of the Society are complete from that year, in a series of stately volumes.

In the Memoir by his widow, Sir Stamford Raffles is said to have discussed, in 1817, with Sir Joseph Banks, then President of the Royal Society, a plan for establishing in London a "zoological collection which should interest and amuse the public." Mr Demetrius Boulger, in his "Life" of Sir Stamford Raffles, repeats this statement, using the same words. But Lady Raffles' book was published in 1830, when the Zoological Society was already a flourishing institution, and I have been unable to find any confirmation either in the Swainson Correspondence in the possession of the Linnean Society, or in any of the Memoirs of Sir Joseph Banks. Dr. Horsfield, afterwards a member of the first Committee of "friends of the proposed Zoological Society," had served in Java and Sumatra under Raffles, whom he put in communication with Banks on other matters. The Rev. William Kirby, in his Introductory Address to the Zoological Club of the Linnean Society of London, delivered on November 29, 1823,

and published in the Zoological Journal of April, 1825, recites the " legitimate objects of a Zoological Society." Importance has been attached to his use of the phrase " Zoological Society," but he does not include among the " legitimate objects " any reference to the importation or keeping of living animals and the context shows clearly that he was using the words in their most general sense, and not as the designation of an actual society, in existence or even in contemplation. But there is a definite statement from Sir Stamford Raffles himself, in a letter written in 1825 to his cousin, Dr. Thomas Raffles, and cited by Mr. Boulger in his " Life " :—

" I am much interested at present in establishing a Grand Zoological Collection in the Metropolis, with a Society for the introduction of living animals, bearing the same relations to Zoology as a science that the Horticultural Society does to Botany. The prospectus is drawn out, and, when a few copies are printed, I will send some to you. We expect to have 20,000 subscribers at £2 each, and it is further expected we may go far beyond the Jardin des Plantes at Paris. Sir Humphry Davy and myself are the projectors, and, while he looks more to the practical and immediate utility to the country gentlemen, my attention is more directed to the scientific department."

Sir Stamford Raffles had reached Plymouth on his final return from Singapore on August 22, 1824. But in July of the same year a meeting of " friends of a proposed Zoological Society " had met in London, had drafted a prospectus, and had appointed the following Committee :—

Chairman : Sir Stamford Raffles.

Duke of Somerset, LL.D., F.R.S.
Earl of Darnley, F.R.S.
Earl of Egremont, F.R.S.
Earl of Malmesbury.
Viscount Gage, M.A.
Samuel, Bishop of Carlisle, LL.D., V.P.R.S.

Lord Stanley, M.P., V.P.L.S.
Sir H. Davy, Bart., LL.D., Pres. R.S.
E. Barnard, F.L.S.
H. T. Colebrooke, F.R.S.
Davies Gilbert, V.P.R.S.
Rev. Dr. Goodenough, F.R.S.
Thos. Horsfield, M.D., F.L.S.
The Rev. W. Kirby, M.A., F.R.S.
T. A. Knight, F.R.S., Pres. H.S.
T. A. Knight, Junr., M.A.
W. Sharpe MacLeay, M.A., F.L.S.
J. Sabine, F.R.S.
N. A. Vigors, M.A., F.R.S.
Chas. Baring Wall, M.P.

The Duke and Duchess of Somerset were intimate personal friends of Raffles and had introduced him to the Prince Regent and Court circles in 1817. In that year Raffles, during a visit to England before he went to Sumatra, had seen much of the Duke and may well have discussed the formation of a society with him. It is clear, however, that Raffles was known to be so involved in the scheme as to be nominated as Chairman in his absence. His own positive statement, confirmed by his selection as chairman, conclusively establish his claim, in association with Sir Humphry Davy, to be the founder of the Zoological Society. There is ample evidence that he took a leading part in its early organisation. Raffles and Davy appeared as Founders of the Society in the Official Lists until 1901, when in consequence of a mistake by Scherren, Davy's name was dropped and those of Sabine and Vigors added.

Something must be said about the legend that the Zoological Society was founded by the Zoological Club of the Linnean Society of London, and hence is a daughter of the Linnean and a granddaughter of the Royal Society. It would have been an honourable parentage, but the only evidence in its favour consists of passages in the last presidential address of the

Zoological Club, delivered and published after the death of Raffles and Davy. Since the last President of the Club, Nicholas Aylward Vigors, was the first secretary of the Zoological Society, the evidence would seem at first sight to be good, and Scherren and others have been deceived by it. In winding up the Zoological Club in November 29, 1829, Vigors said :—

" But it was in the impulse originally given " (by the members of the Club) " to the propagation of the science, more particularly by laying the foundation of the Zoological Society, that powerful association, which, with almost unlimited resources, carried their principles and their objects into execution, that their agency is to be traced."

Later in the address he wrote :—

" I allude to the establishment of the Zoological Society. On the eve of the dissolution of this club, it is a theme not merely of consolation but of triumph, that we have been the embryo of that higher body which has now sprung into the perfect form. The individuals who are now about to separate will carry in their recollection to their latest day, the share which they have had in this great consummation. The occurrences of those evenings will ever be vivid in their memory, when, in conjunction with the illustrious founder and first President of that Society, they suggested the auspiciousness of the times for such an undertaking, and the probability, I should say the certainty, of success."

Vigors himself refers to Raffles by name, as the " founder " of the Zoological Society. Raffles was not a member of the Zoological Club, and of the 21 members of the first Committee of " friends of the proposed Zoological Society," only five, Horsfield, Kirby, MacLeay, Sabine and Vigors himself, were members. But there is more direct evidence. Copies of the Minutes of the Zoological Club of the Linnean Society are preserved

in the possession of the Linnean Society, and manuscript extracts from them made by Yarrell are in the possession of the Zoological Society. They contain no reference to the foundation of the Zoological Society, an incredible omission if the club had been the parent of the Society.

But they do contain a copy of Vigors' own letter resigning his secretaryship of the club because of his duties as secretary of the Zoological Society, and the resolution of the club congratulating him on the "opportunity of employing his talents in a larger circle." Neither of these contains any reference to any part played by the club in the formation of the Society, again an incredible omission, if the club had played a decisive or even an important part in the formation of the Society.

Moreover, it was the custom of the President of the Zoological Club each year to give a record of the more important zoological events of his year of office. The addresses were printed and published, both in the volumes of the *Zoological Journal* and as separate pamphlets. Mr. Bicheno, the President of 1826, referred to the "Zoological Society, recently instituted in London," saying that it contemplated a more practical cultivation of science than any other which existed, mentioning in particular the intention to establish a museum, an osteological collection, and a "Menagerie, Aviary, and Piscina." Mr. Children, the President of 1827, described the new Zoological Society at greater length, and made a special point of the circumstance that, although it had received Royal patronage, it was due to private effort and had not drawn for any of its support on the public purse. Mr. Brookes, the President in 1828, gave a glowing account of the progress of the new Zoological Society, both in its Museum and its Gardens, and contrasted it with the "Society," *i.e.*, the Linnean, "of which we form a part." Not one of these Presidents made the faintest suggestion that the

Zoological Club of the Linnean Society had played any part in the formation of the new Society.

It can be supposed only that Vigors, an Irishman, was administering a little consolatory "blarney" to the members of the Zoological Club of the Linnean Society on their dissolution. Indeed, some consolation was due. The Club was initiated because at the time certain Fellows of the Linnean Society felt that zoology was not receiving sufficient attention, its purpose being to hold separate meetings for papers and discussions on zoological subjects. Kirby, the first President, explained the objects at length, and it is to be noted that these included neither the formation of a collection nor the institution of a menagerie. The Council of the Linnean Society was an autocratic body in these days, and had the notion that their Charter gave them a monopoly of natural history. They had even gone the length of making a futile attempt to make the newly-founded Asiatic Society of Great Britain and Ireland specifically exclude natural history from its purview. They dealt sternly with the aspirations of the founders of the Zoological Club, insisting that the words "of the Linnean Society" be added to the designation, that membership be limited to Fellows of the Linnean Society and that no paper containing original matter should be issued with the sanction of the Club unless it had first been approved by the Council of the Linnean. Later on, the Club begged for a "loose interpretation" of the last rule, urging that it might at least be permitted to sponsor work of minor importance, but the Council sternly refused. Notwithstanding the zeal of its members and the real need for its existence, a Club so fettered could not expect great prosperity. It was initiated in 1823, and the Rev. William Kirby delivered the introductory address at its formal foundation on November 29, 1823. In its later years, its minutes contain many sad entries of "no meeting held because of absence of members," and it was formally dissolved in 1829. If

it cannot claim to be the founder of the Zoological Society, it might have protested that the Zoological Society was its executioner.

The Zoological Society is entitled to regard Raffles as its founder. Thomas Stamford Raffles (1781–1826), the greater part of whose working life was spent in the service of the East India Company, was one of the most notable founders of our Empire in the East, having persuaded the Company to buy Singapore. He had acquired an immense knowledge of the plants and animals of the Malay Archipelago. On his return to England in 1824, he settled at Highwood and intended to devote the rest of his life to philological and natural science.

He died unexpectedly on July 6, 1826, but had had the pleasure of seeing the Zoological Society, of which he was the first President, well on the way to success. Sir Humphry Davy (1778–1829), whom Raffles named as his co-founder, President of the Royal Society from 1820 to 1829, and known popularly as the inventor of the safety-lamp for miners, was the acknowledged leader of science in England. Nicholas Aylward Vigors, the first Secretary of the Society, was an Irish landowner, educated at Trinity College, Oxford, and an ardent ornithologist. He succeeded to the family estates at Carlow in 1828 and became M.P. for Carlow in 1832.

The oldest document relating to the Zoological Society, of which copies have been found, is the following circular, dated February 1, 1825 :—

" It is proposed to establish a society bearing the same relations to Zoology and Animal Life that the Horticultural Society bears to Botany and the Vegetable Kingdom.

" The object is to attempt the introduction of new races of Quadrupeds, Birds or Fishes, etc., applicable to purposes of utility, either in our Farm Yards, Gardens,

Woods, Waters, Lakes or Rivers; and to connect with this object a general Zoological Collection of preserved specimens. The admission fee to the Society to be £3, and the Annual Subscription £2. If it is your wish to be an original member of this Society you will be so good as to signify the same to Mr. T. Griffiths, 21, Albemarle Street."

The circular must have had a favourable response. A list of 151 first subscribers was discovered by Scherren in the archives of the Zoological Society, and was printed by him in his book. I have been unable to find this. It contained the names of the original Committee, except that in place of N. A. Vigors the name W. Vigors appears—an error no doubt, but showing that in the early movement Vigors played a small part. It also includes the Duke of Bedford, the Marquis of Lansdowne, the Earl of Lonsdale, the Marquis of Hertford, the Right Hon. Robert Peel, then Home Secretary, the Right Hon. Sir George Rose, the diplomatist, the Right Hon. Sir Charles Long, then Paymaster-General, and the Right Hon. Lord Holland. There were many Members of Parliament, and amongst other notable names those of the following occur: Sir T. Dyke Acland, Alexander Baring, J. E. Bicheno, W. J. Broderip, Benjamin Brodie, the Rev. W. Kirby, G. B. Sowerby (the elder), W. Swainson, and Charles Bell and Everard Home, the famous anatomists. Thus, from the beginning, the Society depended very slightly on the support of professional zoologists, and largely on persons of public importance—a tradition that it has always maintained.

From references in a circular presently to be quoted, it appears that a prospectus giving the objects of the Society more fully had been circulated privately in 1824. According to a note by the editor of Sir Humphry Davy's Collected Works, this was from the pen of Davy himself. But no copy of it has been discovered.

National Portrait Gallery

SIR T. STAMFORD RAFFLES, F.R.S.
First President, 1826–1827

Under the date of March 1, 1825, however, the following letter and prospectus were circulated, clearly the documents referred to by Raffles in his letter to his cousin of March 9. Several copies of these are in existence.

"ZOOLOGICAL SOCIETY.

"For the general advancement of Zoological Science, it is proposed that a Society shall be established, the immediate object of which will be the collection of such living subjects of the Animal Kingdom as may be introduced and domesticated with advantage in this country.

"For this purpose a collection of living animals belonging to the Society will be established in the vicinity of the metropolis; to which the Members of the Society will have access as a matter of right, and the public on such conditions as may be hereafter arranged.

"It is proposed that the Society shall have a Museum, as well as a Library of all Books connected with the subject; to which access will be given to the Members and the Public as above stated.

"As it is impossible to attain all the objects of the Society on its first establishment, those of utility will engage its earliest attention, and the more scientific views will be attended to as the means of the Society admit.

"The Society will be directed as other public Societies are—by a President, Council, and Officers, and regulated by Laws to be established with the concurrence of the Members of the Society.

"A detailed Prospectus of the objects of this Society having been circulated privately last year, a corrected copy is annexed.

"The Terms of Admission to the Society will be Three Pounds, and the Annual Subscription Two

Pounds ; or the whole to be compounded for on the usual terms.

" A Committee consisting of the following noblemen and gentlemen was originally nominated by a meeting of friends of the proposed Society in July last, and the Prospectus is published under their authority."

Then follow the names of the original committee, with Raffles as Chairman.

" Prospectus of a Society for introducing and domesticating new Breeds or Varieties of Animals, such as Quadrupeds, Birds, or Fishes, likely to be useful in Common Life ; and for forming a General Collection in Zoology.

" Zoology, which exhibits the nature and properties of animated beings, their analogies to each other, the wonderful delicacy of their structure, and the fitness of their organs to the peculiar purposes of their existence, must be regarded not only as an interesting and intellectual study, but as a most important branch of Natural Theology, teaching by the design and wonderful results of organization the wisdom and power of the Creator. In its relation to useful and immediate economical purposes it is no less important. The different races of animals employed in social life, for labour, clothing, food, etc., are the direct objects of its attention ; their improvement, the manner in which their number may be increased, the application of their produce, and its connexion with various departments of industry and manufactures are of the utmost importance to Man in every stage of his existence, but most so in proportion as he advances in wealth, civilisation and refinement.

" It has long been a matter of deep regret to the cultivators of Natural History, that we possess no great scientific establishments either for teaching or elucidating Zoology ; and no public menageries or collections of living animals where their nature, properties and habits

may be studied. In almost every other part of Europe, except in the metropolis of the British Empire, something of this kind exists: but though richer than any other country in the extent and variety of our possessions, and having more facilities from our Colonies, our fleets, and our varied and constant intercourse with every quarter of the globe, for collecting specimens and introducing living animals, we have as yet attempted little and effected almost nothing; and the student of Natural History, or the philosopher who wishes to examine animated nature, has no other resource but that of visiting and profiting by the magnificent institutions of neighbouring countries.

"In the hope of removing this opprobrium to our age and nation, it is proposed to establish a Society bearing the same relation to Zoology that the Horticultural does to Botany, and upon a similar principle and plan. The great objects should be, the introduction of new varieties, breeds, and races of animals for the purpose of domestication or for stocking our farm-yards, woods, pleasure-grounds, and wastes; with the establishment of a general Zoological Collection, consisting of prepared specimens in the different classes and orders, so as to afford a correct view of the Animal Kingdom at large in as complete a series as may be practicable, and at the same time point out the analogies between the animals already domesticated, and those which are similar in character upon which the first experiments may be made.

"To promote these objects, a piece of ground should be provided in the neighbourhood of the metropolis affording sufficient accommodation for the above purposes; with a suitable establishment, so conducted as to admit of its extension on additional means being afforded.

"As it is presumed that a number of persons would feel disposed to encourage an institution of this kind, it is proposed to make the Annual Subscription from

each individual only Two Pounds, and the Admission Fee Three Pounds. The Members, of course, will have free and constant access to the Collection and Grounds, and might, at a reasonable price, be furnished with living specimens, or the ova of fishes and birds.

"When it is considered how few amongst the immense variety of animated beings have been hitherto applied to the uses of Man, and that most of those which have been domesticated or subdued belong to the early periods of society, and to the efforts of savage or uncultivated nations,* it is impossible not to hope for many new, brilliant and useful results in the same field, by the application of the wealth, ingenuity, and varied resources of a civilized people.

"It is well known with respect to most of the Animal Tribes, that domestication is a process which requires time; that the offspring of wild animals raised in a domestic state are more easily tamed than their parents; and that in a certain number of generations the effect is made permanent and connected with a change, not merely in the habits but even in the nature of the animal. The inconveniences of migration may be, in certain cases, prevented, and the wildest animals when supplied abundantly with food, may lose the instinct of locomotion, and their offspring acquire new habits; and it is known that a breed, fairly domesticated, is with difficulty brought back to its original state. Should the Society flourish and succeed, it will not only be useful in common life, but would likewise promote the best and most extensive objects of the Scientific History of Animated Nature, and offer a collection of living animals, such as never yet existed in ancient or modern times. Rome, at the period of her greatest splendour, brought savage monsters from

* We owe the peacock and common fowl to the natives of India; most of our races of cattle, and swans, geese, ducks, to the aborigines of Europe; the turkey to the natives of America; the guinea fowl to those of Africa. The pike and carp, with some other fishes, were probably introduced by the monks.

every quarter of the world then known, to be shown in her amphitheatres, to destroy or be destroyed as spectacles of wonder to her citizens. It would well become Britain to offer another, and a very different series of exhibitions to the population of her metropolis ; namely, animals brought from every part of the globe to be applied either to some useful purpose, or as objects of scientific research, not of vulgar admiration. Upon such an institution, a philosophy of Zoology may be founded, pointing out the comparative anatomy, the habits of life, the improvement and the methods of multiplying those races of animals which are most useful to man, and thus fixing a most beautiful and important branch of knowledge on the permanent basis of direct utility.

"*March* 1, 1825."

The *Literary Gazette*, then an important journal devoted to science and literature, published the greater part of the Prospectus, attributing the scheme to Sir Humphry Davy. In comment on the proposed Society it said :—

"It has been much canvassed, and we hear a great diversity of opinions upon it. Those friendly to it re-echo the language of the prospectus—declare it to be worthy of an enlightened country—and anticipate wonderful improvements from its being carried into effect ; while those of an opposite way of thinking laugh at it as a wild speculation, and con little thanks to the President of the Royal Society for attempting to make an Ark in London for the reception of pairs of all living things, after their kinds."

After remarking that the paragraph dealing with the effects of domestication was "strangely worded," it observed with regard to the "peroration" :—

"Like too many of our modern associations and companies, this is extremely sonorous on paper ; but, alas for the execution of the design—is it not altogether visionary ? Yet we understand it is patronized by

some very influential men; and no one could be sorry to see the experiment tried."

The writer appears to have been specially perturbed by the idea of producing new creatures by domestication. It was still the fashion to abuse the doctrines of Treviranus and Lamarck, the high authority of Cuvier being taken as decisive in favour of special creations and catastrophic destructions. The writer pretended even to be doubtful of the meaning of the phrase "a collection of living animals such as never yet existed in ancient or modern times," and asked: "What the dickon's does this assertion mean? Are we to have animals that never existed before?"

On Wednesday, June 22, 1825, according to the following MS. Minute in the possession of the Society, "At a meeting of the original proposers of the Society, etc., the Earl of Darnley in the Chair, resolved that the following gentlemen be appointed to form a Committee." Then follow the names of the Committee appointed in 1824. It was further resolved that "Messrs. Drummonds be appointed Bankers and that this Meeting be advertised when the number of its members amount to 200."

The next record, also a manuscript in possession of the Society, is as follows:—

"At a Committee held on Monday, the 26th February, 1826, present Sir T. S. Raffles (in the Chair), His Grace the Duke of Somerset, Earl Darnley, Sir Humphry Davy, Bt., Sir Everard Home, Bt., Davies Gilbert, Esq., Joseph Sabine, Esq., N. A. Vigors, Esq., Dr. Horsfield, and, visitors, Lord Auckland, Sir Robert Inglis, Bt., and Dr. Harewood."

The Committee, taking into consideration the objects and plan of the proposed Society, "Resolved that it be designated the Zoological Society and that an application be made to Government for an allotment of ground in the Regent's Park suitable to the purposes of the Institution."

" A Deputation consisting of the Earl of Darnley, Lord Auckland, Sir Humphry Davy and Sir Stamford Raffles is appointed to wait on the Earl of Liverpool in order to ascertain the disposition of Government and to apply for a grant of the ground required.

" Sir Humphry Davy being already in communication with Mr. Peel, who has shewn a favourable disposition to support and patronize the Society, he is requested in the first instance to confer with him and obtain his advice and if possible his assistance in attaining the object desired.

" It being considered advisable that the objects and pursuits of the Society should be clearly defined in a Prospectus, and that a plan for the formation of the Society should be framed, a sub-Committee consisting of Sir Stamford Raffles, Mr. Sabine, and Mr. Vigors is appointed for the purpose.

" In drawing up this Prospectus the Committee will consider that as the immediate objects of the Society must necessarily be limited by their means, it is not deemed advisable in the first instance that they should extend beyond the introduction and domestication of new Breeds of Animals, with a Museum and Library to be attached, as its resources may admit.

" With regard to ulterior views and the more enlarged objects to which it is hoped the establishment of this Society may lead by attracting the attention of the public and promoting a taste for Natural History in general and Zoology in particular, the Committee are of opinion that a Report may be submitted to the next general meeting, containing a Review of the present state and progress of Natural History, especially Zoology, with an account of the Institutions by which it is encouraged on the Continent, and shewing the necessity of some similar establishment in this country, so as to place the interests of the science on a footing at least equal to that on which they stand elsewhere."

The same sub-committee, consisting of Sir S. Raffles, Mr. Sabine and Mr. Vigors, is appointed to frame this Report.

Joseph Sabine (1770–1837), who now comes into prominence amongst the friends of the Society and was its first Treasurer, was a barrister and inspector-general of assessed taxes. He was an original Fellow of the Linnean Society and Honorary Secretary of the Horticultural Society.

The next record is a manuscript Minute dated March 4, 1826.

"Present, Sir Humphry Davy, the Rev. Dr. Goodenough, Dr. Horsfield and Mr. Vigors.

"Resolved that the same sub-committee which was appointed at the Meeting of Monday, February 26, 1826, for the purpose of drawing out a Prospectus for the Society be requested to superintend the correction of the original Prospectus circulated last year and the publication and circulation of both Prospectuses now submitted to the Meeting.

"That Sir Stamford Raffles and Sir Humphry Davy be appointed a Committee to report on the Place at Carshalton which had been proposed last year for the preservation of Fish and Water Fowl."

The next record is that of a Meeting held on April 28, 1826, the Minute of which is preserved in MS., as follows:—

"Present: Sir Stamford Raffles, Chairman, Lord Auckland, Mr. Sabine, Dr. Horsfield, Mr. Barnard, Sir Everard Home, Mr. Vigors, and General Hardwicke, Mr. Greenough and Mr. Barnard, visitors.

"The Committee appointed for drawing up and distributing a Prospectus explanatory of the objects of the Society, reported that such a Prospectus had been printed and circulated among those persons who were likely to favour the interests of the Society.

Royal Zool. Soc., Ireland

NICHOLAS AYLWARD VIGORS, F.R.S.
Secretary, 1826–1833

" The sub-committee appointed to wait on the Earl of Liverpool (the Premier) and Mr. Peel (afterwards Sir Robert) for the purpose of ascertaining the disposition of Government towards the Society, and for applying for ground in the Regent's Park, reported that having waited on Mr. Peel they had the satisfaction of finding that gentleman extremely favourable to the views of the Society. They afterwards waited on Mr. Arbuthnot, and, in consequence of his suggestion, applied to the Commissioners of Woods and Forests for the ground required; and they submitted the accompanying correspondence.

" The Chairman informed the Committee that he had not yet received the conclusive reply of Government, but that he felt authorised to state that Government had consented to the wishes of the Society respecting the grant of ground in the Regent's Park.

" The sub-committee appointed to examine and report on the Place at Carshalton which had been proposed last year for the preservation of Fish and of Water Fowl, reported that they examined the situation and found it adapted to the purpose. They in consequence entered into a negotiation with the proprietor which is not yet concluded.

" The Chairman informed the Committee that he had issued circulars among the Friends of the Society for a general Meeting to-morrow, April 29th, in order that the Society may be organized without further delay. The following Resolutions were then read, and approved of, to be submitted to the General Meeting to-morrow. (The draft is preserved in MS.)

" The following noblemen and gentlemen were then nominated to be proposed at the General Meeting to-morrow as the Council of the Society for the ensuing year. (The list is given in the report of the first General Meeting.)

"The following gentlemen were then nominated to be proposed as officers of the Society :—

Treasurer : Mr. Sabine.
Secretary : Mr. Vigors.
Assistant Secretary : Dr. T. Horsfield.

"The Chairman reported that he had engaged an office at No. 4, Regent Street, for the transaction of the affairs of the Society ; and that an application having been made to the Council of the Horticultural Society for the use of their room for the General Meeting to-morrow, they kindly complied with the request."

The negotiations with the Government for a plot of land in Regent's Park had not been altogether smooth. The sub-committee had first applied for an area in the centre of the Park, almost certainly part of the ground now occupied by the Royal Botanic Society, but had been offered instead a portion near the canal, part, in fact, of the present Gardens. Lord Auckland and Sir Stamford Raffles had inspected this, and then wrote as follows to Mr. Arbuthnot, one of the Commissioners of Woods and Forests :—

"Grosvenor Street.
17*th March*, 1826.

"Sir,

"We yesterday visited the piece of ground abutting the Regent's Canal, and we are of the opinion that from its great publicity, the expense of fencing, its extreme narrowness and nearness to the road, it was liable to many objections, and that it was possible upon further consideration that the Crown might be induced to let us have ground still more adapted to our objects. We afterwards had some conversation with Mr. Burton and begged him to speak to you on the subject, having put him as far as we were able in possession of our views, but as you wished for some further details as to the purposes to which we might wish to apply the land, we have taken the liberty of addressing you.

"It is clear that whatever the Zoological Society may undertake must depend upon the support it finds and subscriptions it may obtain, and these subscriptions again will depend upon the objects proposed being generally interesting, useful and attractive; and as we conceive that these objects would be most effectually advanced by the sanction of Government, we would willingly submit to have every step we take, every building we erect and every animal we introduce approved of or rejected by your Office.

"Our first plan would be to have a garden laid out in aviaries, paddocks for Deer, Antelopes, etc., stabluaries for such animals as may require them, lodges and perhaps suitable apartments for the Society to meet in, and if possible pieces of water for fish and aquatic birds. Our buildings would for the most part be low and in no case offensive, and the plans will be readily submitted to you, and as we find support from the public we would extend the objects of our establishment. We should eventually wish to have a Museum attached to it whenever our finances admit, and this would of course be on such a scale and plan as would render it ornamental and suitable to the situation.

"We feel that with perfect prospect of success we should not only make an establishment attractive in itself but extremely ornamental to the Regent's Park, and we would if it were desired give immediate directions to Mr. Burton to draw sketches of what might be its effect, for your satisfaction.

"Certainly the ground best adapted to our purpose would be the centre of the ring marked Letter A. It is sufficiently spacious to enable us to be retired and would be convenient to the greatest number of visitors. It is proposed, we believe, to have a reservoir of water there which might be laid out in any shape for our purposes. We therefore hope that we do not ask too much in suggesting that five or six

acres might in the first instance be allotted to us in this spot, an arrangement which would be attended with great advantage to ourselves, and as we are informed, not liable to objection on the part of others.

"We would also suggest our wishes that this grant should be open to further extension hereafter as the Society may require it, and may be found deserving of the indulgence, and with this view we would request that the whole of the plot may be reserved, in case that upon our plans being further developed, we receive that support from our subscribers which we have every reason to expect, and which would enable us to pursue our plans in Natural History on a more extensive scale. We perhaps may not be too sanguine in contemplating the eventual possibility of forming on this advantageous site so admirably adapted for the purpose, an Establishment which will embrace the united interests of Zoology and Botany—and certainly nothing would be more creditable to the Scientific Character of the Nation and at the same time more ornamental to the Park itself, than a Plan which should provide for the accommodation of the Zoological Department in the centre of the before-mentioned plot and the appropriation of the surrounding ground to the purposes of a Botanic Garden.

"We have said nothing of the real services which we hope to render to Science, and of the objects of utility which we trust we shall be able to carry into effect, as these will be developed in the detailed prospectus, but we have endeavoured only to explain how far the nature of the Buildings and the laying out of the Grounds may be attractive to the eye.

"We have the honour to be, etc.,

(Signed) AUCKLAND,
T. S. RAFFLES.

"P.S.—It has not escaped us that some objection might possibly arise from Mr. Jenkins, the present

Tenant at Will of the ground in question, but we have no doubt than an arrangement could be effected with him by which we could offer him compensation for the removal of plants from the land which it may be necessary immediately to clear, and by giving him the superintendence of our ornamental pleasure ground, and that upon consideration of new attractions to the neighbourhood of his garden he will be led at once to acquiesce."

The Commissioners of Woods and Forests remained obdurate, and, in a letter dated March 23, said that the sanction of the Treasury would be required, that they would have to be informed of the " probable amount of the funds of the Society available for improvements or buildings upon the ground applied for in the first instance, and of the nature of the works which they would undertake to carry into effect." Further, that " Mr. Jenkins, a nurseryman, had rented the ground on the understanding that he should continue to do so unless the land should be required for building ranges of dwelling houses, and that as he had expended heavy sums in bringing the ground into a high state of cultivation he would require adequate compensation."

The sub-committee saw that conditions were being made with which the Society in its present state could not undertake to comply, and accordingly on April 7 Lord Auckland, Sir Humphry Davy and Sir Stamford Raffles applied for " twenty acres in the north-eastern corner of the Park." To anticipate difficulties that might be raised, they said that " it may be advisable for us to apply to the Crown for such a Charter as may enable us to hold land," but in the meantime asked for a lease. They added, to show that immediate advantage would be taken of the land if granted, that " Mr. Cross, of Exeter 'Change, had offered his ' lamas ' and birds and such part of his collection as they might choose."

The Commissioners acceded to a portion of this request and at the first General Meeting on April 29 their reply was read as follows :—

"Office of Woods, Etc.,

28 *April*, 1826.

"My Lord and Sirs,

"The Commissioners of His Majesty's Woods, Forests, and Land Revenues, having laid before the Lords of His Majesty's Treasury your applications, on behalf of the Zoological Society, for a grant of land in the Regent's Park, for the purposes of the Society's intended establishment; I am commanded to acquaint you that their Lordships have been pleased to authorize the said Commissioners to let to you, as Trustees for the Society, on a yearly tenancy, a plot of land not exceeding five acres in the whole, partly on the situation marked No. 8 on the accompanying Plan of the Park, and partly on the opposite side of the adjoining road, at a yearly rent calculated at the rate of £6 6*s*. per acre for so much as shall be within the Park, and at 8*s*. per foot on the frontage of so much as shall be on the north-east of the said road; with the option on the part of the Society of taking a Lease at the end of five years for such further term as may be agreed upon, and at such rent as shall be equal to the rent paid by other Lessees of land designed for sites for villas in the interior of the Park, and upon the usual conditions.

"The Society is to fence and lay out, plant, keep, and occupy the ground within the Park in such manner as shall be previously approved by the said Commissioners, who are to be at liberty to require the removal of any animal which may be brought upon the premises by the Society, and which may be deemed likely to become a nuisance or objectionable in the neighbourhood. And if any buildings are to be erected, such buildings are to be placed on the ground without the Park on the north-east side of the road above-mentioned, and according to Plans, Elevations and

Particulars to be previously approved of by the Commissioners.

"If the land should be relinquished by the Society at the end of three or five years, and before any lease thereof shall be granted, the Society is to be at liberty to remove the buildings which they may have erected, on restoring the land to a proper state of herbage, and putting the fencing into the same state as at the time of their taking possession of the ground.

"I have the honour to be,

"My Lord and Sirs,

"Your most obedient servant,

"A. MILNE."

The plot of land on the south side of the Outer Circle roadway, not exceeding 5 acres, was approximately the area enclosed in a line from the present Main Gate by the Terrace Walk to about the beginning of the Great Lawn, then turning at right angles to meet the Outer Circle again, near the Old Tunnel, and on the North Side, the strip exactly opposite, between the Outer Circle and the Canal, but continued to the west about the same distance. Any buildings were to be confined to the land between the Outer Circle and the Canal.

With respect to the land at Carshalton, supposed to be suitable for Fish and Water Fowl, the negotiations with the proprietor subsequently came to nothing, and the scheme was dropped. It was probably due in the first place to Sir Humphry Davy, who had been much interested in pisciculture and had given an account in his "Salmonia" of the operations of stripping fish and artificially fecundating the eggs.

The first General Meeting of the Friends of the proposed Zoological Society was held at the House of the Horticultural Society, Regent Street, on April 29, 1826. The Minutes give a list of 48 persons who attended. It includes Sir Stamford Raffles, the

Marquis of Lansdowne, the Earls of Darnley and Egremont, Lords Auckland, Clinton and Stanley, the Lord Mayor, Sir Humphry Davy, Sir Everard Home, Sir Thomas Ackland, Mr. Bennett, Dr. Horsfield, Mr. Vigors, Mr. Yarrell. On the motion of Sir Humphry Davy, seconded by the Earl of Darnley, Sir Stamford Raffles took the Chair, and Mr. Vigors was requested to act as Secretary of the Meeting. The Minutes of the General Meeting of Friends of the proposed Society, held on the 22nd of June, 1825, and also of the several meetings of the Committee appointed at that Meeting, were then read. The letter from the Commissioners of Woods and Forests agreeing to grant a plot of land in Regent's Park was read. Next the Society was definitely constituted by the adoption of the following resolutions which had been drafted by the Committee and were put from the Chair :—

"I.—That a Society to be designated the 'Zoological Society,' be instituted for the advancement of Zoological knowledge.

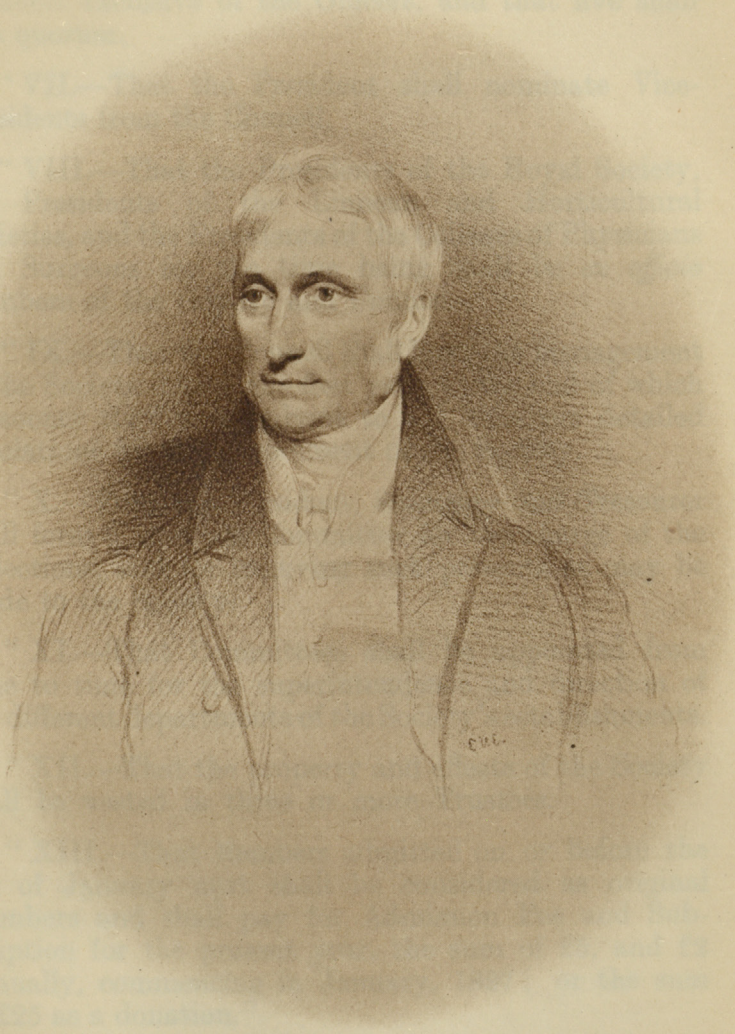
"II.—That the attention of the Society be directed to the following objects :—

"The formation of a Collection of living Animals ; a Museum of preserved Animals ; and a Library connected with the subject.

"III.—That the Society shall consist of such Members as have already subscribed their names as desirous of joining the Society or who shall do so on or before the 1st of January next, with the approbation of the Council ; and of such other Members as shall subsequently be admitted by ballot.

"IV.—That the Funds of the Society shall consist of the Admission Fees and Annual Contributions of the Members, together with such donations as may be received in furtherance of the objects of the Society.

"V.—That the affairs of the Society shall be directed by a President, Treasurer, Secretary and Council, the Officers being Members of the Council.



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JOSEPH SABINE, F.R.S.
Treasurer, 1826–1830

" VI.—That the Council shall consist of eighteen Members exclusive of the Officers, and that five shall be a quorum.

" VII.—That the President shall nominate Vice-Presidents from the Council.

" VIII.—That the Presidents of the Royal Society, the Presidents of the Linnean and Horticultural Societies, and the Presidents of the Colleges of Physicians and Surgeons for the time being shall be *ex officio* members of the Society and Council.

" IX.—That the Council shall have the management of the Society during the first year. at the end of which or sooner they shall submit to the Members detailed regulations for the government of the Society.

" X.—That the President, Secretary and Treasurer shall form a standing Committee for the charge of the collections, and for receiving such presents as may be made to the Society.

" XI.—That Committees shall be appointed from time to time for the superintendence and direction of the different departments of the Society's establishments.

" XII.—That the property and effects of the Society shall be vested in three or more Trustees.

" XIII.—That Members admitted on or before the 1st of January next shall be considered as original Members and shall pay for Admission Fee and Subscription for the present year, the sum of £5, and £2 annually, commencing in January, 1827 ; or the sum of £25 as a donation."

It was then moved by the Marquis of Lansdowne, and seconded by the Earl of Darnley, and carried by acclamation—

That Sir Stamford Raffles be appointed President of the Zoological Society.

The following Resolutions were then proposed by the President and carried unanimously :—

That the Council for the ensuing year shall consist of the following noblemen and gentlemen :

Sir Stamford Raffles, *President*,
His Grace the Duke of Somerset,
The Most Noble the Marquis of Lansdowne,
The Right Hon. the Earl of Darnley,
The Right Hon. the Earl of Egremont,
The Right Hon. Viscount Gage,
The Right Hon. Lord Auckland,
The Right Hon. Lord Stanley, M.P.,
Sir Everard Home, Bart.,
Edward Barnard, Esq.
Sir Humphry Davy,
J. E. Bicheno, Esq.,
J. G. Children, Esq.,
H. T. Colebrooke, Esq.,
Rev. Dr. Goodenough,
G. B. Greenough, Esq.,
Dr. Thomas Horsfield,
Joseph Sabine, Esq.,
Charles Stokes, Esq.,
N. A. Vigors, Esq.,
Charles Baring Wall, Esq., M.P.,

and that the following gentlemen be elected Officers for the ensuing year :—

Treasurer : Joseph Sabine, Esq. ; *Secretary :* Nicholas Aylward Vigors, Esq. ; *Assistant Secretary :* Dr. Thomas Horsfield.

It was proposed and resolved that Messrs. Drummond & Co. be appointed Bankers of the Society, and that Members be requested to pay in their subscriptions at their earliest convenience.

The President then read an opening Address to the Society in which he " took a review of the past and present state of Zoology in this country, and entered

into a detail of the objects and plans of the Society." Unfortunately, no copy or abstract of this Address has been discovered.

The Meeting closed with votes of thanks to the President and to the Secretary, and to the Horticultural Society for the loan of their room.

The period of incubation was over and the new Society duly hatched. The Council held its first formal Meeting on May 5, under the Chairmanship of the President. The President drew up and circulated the following circular, which was signed by the Secretary :—

"ZOOLOGICAL SOCIETY.

"A Society has been formed for the advancement of Zoology, the immediate object of which will be the introduction and exhibition of such subjects of the animal kingdom as may be of utility, and a source of interest and gratification.

"With this view a collection of living animals in Aviaries, Gardens, Ponds, Enclosures and Buildings will be formed, to which will be attached a Museum and a Library connected with the subject.

"An advantageous site has been obtained from His Majesty's Government for this purpose, in the Regent's Park, to which such subordinate establishments will be annexed as circumstances may require.

"To these establishments Members will have access as a matter of right, and the public in general on such conditions as may be hereafter arranged. Members will also have a preference in obtaining specimens of such subjects as may be imported.

"The extent to which these objects can be attained must depend on the amount of subscriptions; and the most liberal support is therefore solicited.

"The Society consists of such Members as have already subscribed their names, or who shall do so with the approbation of Council, on or before the 1st

of January next, and subsequently of such other Members as shall be admitted by ballot.

"The present terms of admission are either the subscription of five pounds, with the annual payment of two pounds on every first of January; or a donation of twenty-five pounds or upwards, for it is hoped that the support of those able to give the Society efficient assistance will not be limited to this amount.

"It was then stated that upwards of 300 Members had already joined the Society. A list of the Council was given and it was added that a house had been taken for the temporary accommodation of the Society at No. 33, Bruton Street, where books were open for subscriptions and where all communications would be received. It added that subscriptions would be received at the Office and at Messrs. Drummonds, Charing Cross."

For the most part the Press paid little attention to the new Society. *The Times* of May 2 reported the General Meeting briefly, and in addition to recording the names of some of those who were present, stated that the Society already "numbered amongst its most zealous supporters, His Royal Highness the Duke of Sussex; the Dukes of Somerset and Bedford; the Marquis of Hertford; Earls Spencer, Malmesbury, Carnarvon and Minto; the Bishop of London, the Bishops of Carlisle and of Bath and Wells; the Right Hon. Robert Peel, F. C. Robinson, Sir Charles Long, and C. Arbuthnot; Sir Thomas Lawrence, Mr. Chantry, Dr. M. Buckland, John Wilson Croker, Esq., T. A. Knight, Esq., Mr. Macleay and other distinguished characters." The *Literary Gazette*, however, continued to make rather acid fun. Its report on May 6 was as follows:—

"Zoological, or Noah's Ark Society.

"A public meeting took place on Saturday last, at the rooms of the Horticultural Society, at which about a hundred persons were present. Sir Stamford Raffles

was called to the Chair, and read an address recommending the formation of a Society, the objects of which should be to import new birds, beasts and fishes into this country from foreign parts. The Regent's Park is to be headquarters ; though, if the subscriptions amount to a sufficient sum, it is hoped that strange reptiles may be propagated all over the kingdom. But there is neither wisdom nor folly new under the sun. Worthy Dr. Plot informs us, in his History of Oxfordshire, that King Henry the First enclosed the park at *Wudestoc* ' with a wall, though not for *deer*, but for all foreign *wild beasts*, such as *lions*, *leopards*, *camels*, *linxes*, which he procured abroad of other *princes ;* amongst which, more particularly, says *William of Malmesbury*, he kept a *porcupine*, *hispidis setis coopertam*, *quas in canes insectantes naturaliter emittunt*, i.e., covered over with sharp-pointed *quills*, which they naturally shoot at the dogs which hunt them.' This is the first British National Menagerie that we have read of ; the Romans were much addicted to wild beast shows. Considering the advanced state of knowledge it is to be expected that the new Zoological Association will beat both the Romans and King Henry ; though we do not know how the inhabitants of the Regent's Park will like the lions, leopards and linxes so near their neighbourhood."

Chapter II.

ORGANISING THE SOCIETY, 1826–1830

The Council got to work at once, and, in the next few years, the main features and activities of the Society, as it exists to-day, were developed. It is impossible to give too much credit to the foresight, imagination, and vigour displayed in the earliest days of the Society. Behind every successful organisation there is usually a single brain, an individual who may indeed be sympathetic to suggestions from many others, but knows how to sift these and inspire them with a single purpose. Although Sir Stamford Raffles died between the second and third meetings of Council, he lived long enough not only to establish the Society but to stamp its future with his strong personality.

He appointed the Duke of Somerset, the Marquis of Lansdowne, the Earl of Darnley, and Lord Auckland as Vice-Presidents. The Council then arranged that the keepers of the Menageries of the Tower and of Exeter 'Change should be employed to take care of any animals presented to the Society until the new establishment was ready. The President was asked to seek out and secure a House for the Society. A clerk was appointed. The first gifts were accepted. These were a griffin vulture and a white-headed eagle, the donor, Mr. Joshua Brookes, undertaking to keep them until the Society was ready, and a female deer from Malaysia, presented by Captain Pearl, a friend of the President. Committees were appointed to draft by-laws, to enquire into an establishment for fish, to manage the lay-out of the grounds and buildings in Regent's Park, to control the Menagerie, to look after the Museum, and to form a Library.

At the second meeting, it was reported that the finances were sufficiently promising to justify an

expenditure on the House and Office at the rate of £600 per annum, and a capital outlay of £5,000 on the Gardens in Regent's Park and £1,000 on the Museum and Library. The President had been in communication with Decimus Burton, the architect who had laid out Hyde Park, and had got him to examine and report on the House in Bruton Street about to be taken by the Society. He also submitted the first plan for the Gardens, which was approved. Decimus Burton was definitely appointed architect to the Society at a later meeting. Mr. Cross, of Exeter 'Change, had offered to sell all his collection to the Society, and wished to be employed as manager of the Society's Menagerie, but both offers were declined.

A special meeting was called by the Duke of Somerset, a Vice-President, on July 8, to announce the "sudden and lamented death of their President," which had taken place from apoplexy on July 6. It was agreed to defer the appointment of a new President until later, and to leave it to the Vice-Presidents to "superintend the execution of the plans already commenced under the direction of their late President."

There was no further meeting of Council until the end of November. Little seems to have been done either at Regent's Park or in the Gardens, but it was formally resolved that in due course the public should be admitted to the Museum, and, in the meantime, authority was given for the purchase of cabinets, cases and other furniture. In December, Lord Auckland announced that the Marquis of Lansdowne had consented to be nominated as President, an office to which he was duly elected at the Annual Meeting next year, and continued to hold until 1831. Clearly there had been some dissatisfaction with the way the Committees had been working, and it was agreed that their meetings should be "open," by which I infer, it was meant that any Member could attend any meeting of any Committee. It was also agreed to allow the Secretary to purchase the

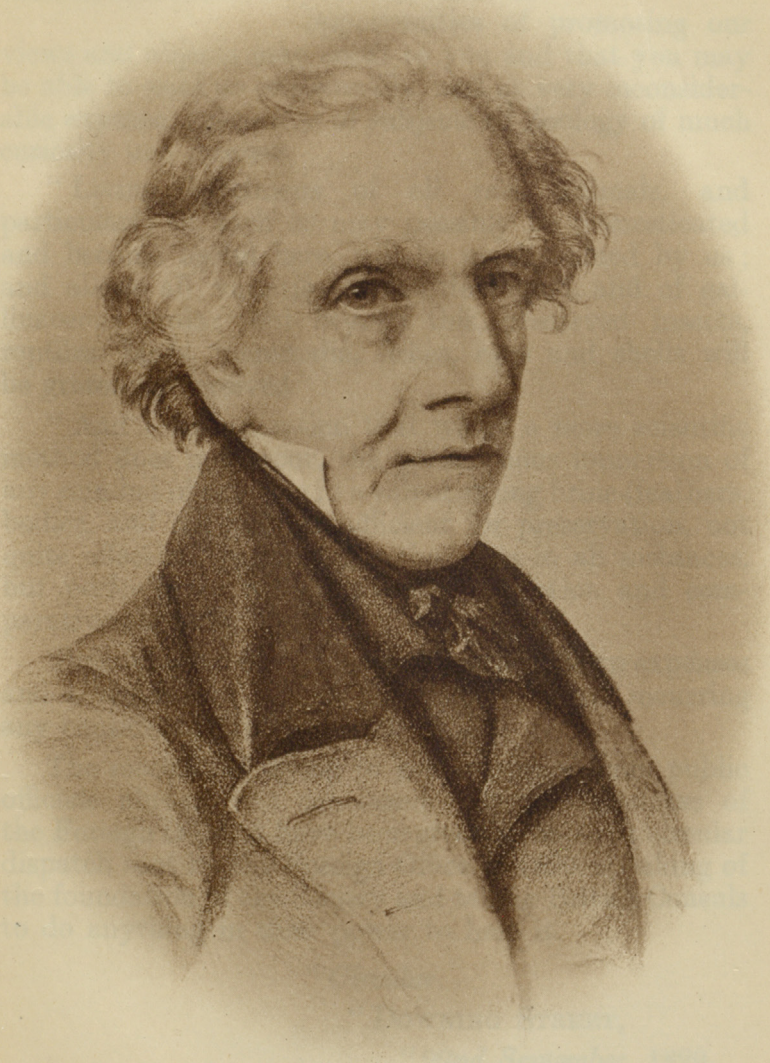
skins of some Brazilian birds for the Museum. The next Meeting of Council was not held until the end of February, when it was decided to invite Members of the Houses of Parliament and such other persons as might be "likely to forward the views of the Society" to inspect the Museum.

At a Special General Meeting of the whole Society, held on March 7, the Marquis of Lansdowne was elected President. Thanks were recorded to a number of donors to the Museum and to the Menagerie, and the foundation of the Library by various presentations of books was announced.

In April, a series of important events took place. The negotiations with the Office of Woods were completed and Decimus Burton, as the architect of the Society, was appointed to confer with the architect of the Commission to mark out the actual ground. It was resolved that ladies be admitted as Members on the same terms and conditions as men—an interesting step, as at that time ladies were not admitted to the Fellowship of most other societies. It is to be noted, however, that it was not until very much later, actually during my own tenure of Office, that ladies became habitual attenders at the Scientific Meetings. It was further agreed to institute a set of Corresponding Members who might assist the Society in foreign parts. From a copy of a letter of instruction to these, to be transmitted through the Colonial and other Government offices, it is clear that the needs of the Museum were taken into special account. The following is a copy of the circular, with blanks left to be filled, according to the circumstances :—

"Zoological Society,
"33, Bruton Street.
, 1827.

"Sir,—I take the liberty, with the sanction of of sending to you the last Report of the Zoological Society. It is possible



J. Errleben

DR. THOMAS HORSFIELD, F.L.S.
First Vice-Secretary, 1826–1828

Dr. Thomas Horsfield, F.L.S.
First Vice-Secretary, 1836–1845

that, in the course of your residence at
opportunities of promoting our views and objects may occur to you and that you may be able to send us occasionally, and at very inconsiderable expense, specimens of subjects of Zoology of much curiosity and interest.

"Living specimens of all rare animals, and particularly of such as may possibly be domesticated and become useful here, will be much valued by us; and above all, varieties of the deer kind, and of gallinaceous birds; but beyond this, preserved insects, reptiles, birds, mammalia, fishes, eggs and shells will be gratefully received.

"And I may mention that where a more scientific method does not occur, the promiscuous immersion of any number of subjects in a tub of strong brine (feathers, bodies, and all) will be sufficient for preservation, not quite effectual, perhaps, for the skins in all instances, but perfectly so for purposes of dissection and comparative anatomy."

Then followed directions as to cutting down expenses and a request to consult the Society before incurring any considerable expenditure.

The method of trying to get assistance from public officials abroad was continued. By the kindness of the Foreign Office, I have been given a copy of a circular dispatch sent by the Foreign Office in 1829, speaking of the foundation of the Society and telling British Consuls to do anything in their power to help it.

"*Circular.*

"Downing Street,

"*22nd September*, 1829.

"Dear Sir,—A Zoological Society has lately been established in London, and a few acres of ground in the Regent's Park have been laid out as a garden for the reception of curious beasts and birds from all quarters of the world, in imitation of the Jardin des

Plantes, at Paris. It is hoped, even if this establishment should not materially advance the purposes of science, that at least it will become an object of public interest as a place of amusement, and indeed to this extent it has already succeeded, far beyond the expectations of the original Promoters.

" Having stated thus much, I feel satisfied that you will forgive me for asking your assistance in procuring and sending home any rare animals which may be worthy of a place in this rising establishment.

" The Funds of the Society cannot afford to incur a great expense, but any moderate charge to which you may be subject in obtaining these animals will, of course, be defrayed by the Society and they had better be addressed to N. Vigors, Esq., the Secretary, to whom a letter of advice transmitted thro' this Department, should also be written.

" I remain, etc.,

(Signed) " R. M. Hay."

The first Corresponding Members selected by Council in April, 1827, and elected at the General Meeting in May, were Mr. Boyle, of Fernando Po; Mr. John Frembly, R.N., of H.M.S. " Woodlark "; Dr. Lyall, of Madagascar; Captain Lyon, R.N.; Dr. Sibbald, of Mauritius; Dr. Smith, and Mr. Stephenson, of the Cape of Good Hope.

In April, also, the Museum received its first notable contribution, which was the late President's Sumatran Collection, given by Lady Raffles, on the conditions that each specimen should be given a distinctive mark, that a separate catalogue should be made, and that the property should remain vested in the representatives of Sir Stamford, to be resumed in the event of there being a breach in the Society. The conditions were accepted; they seemed onerous, but the Society was not yet firmly established, and at least they did not include the proviso, often made and most unfortunate

for the scientific work of a Museum, that the collection should be kept together as a whole. It was agreed that Lady Raffles should be proposed as an Honorary Member, and the election was duly made at the next General Meeting.

An Audit Committee was appointed, composed partly of members of Council and partly of ordinary Members.

On April 25 was held what may be described as the first Scientific Meeting of the Society. I have been unable to find any official record of it, but Sir Arthur Smith Woodward called my attention to a report in *The Times* of April 27, 1827, which stated that "Dr. Joshua Brookes, the eminent anatomist, had been invited by the noble directors of the Society to lecture on his dissection of the body of an ostrich which had lived for two years at Windsor, and at death had been given to the Society by the King." Mr. Joshua Brookes (1761–1833), who had been trained in London and Paris, was a successful teacher of anatomy, with a large private museum at his school in Blenheim Street.

At the General Meeting held on May 19, the Marquis of Lansdowne, the new President, took the Chair. After the formal business, he gave an account of the progress of the Society and said that the receipts in last year had amounted to £2,489 9*s*. 5*d*., and the expenditure to £978 15*s*. 1*d*.

During the rest of the year progress was made with the Gardens. A contract for a supply of water was made with the West Middlesex Company. It was agreed to provide quarters for resident keepers. The first keeper, James Cops, was appointed in June, at a salary of a guinea a week, and later in the year another keeper was appointed, also at a guinea, and a third at 18*s*. Zaccheus Long was appointed gardener at £60 per annum, and a carpenter at 33*s*. a week. It was also agreed to select an Assistant-Secretary at £100 a year, to reside in the Gardens, "with the entire superin-

tendence of the establishment." On the proposal of the Commissioners of Woods and Forests, the lake and islands in Regent's Park were handed over to the Society, and Members were given permission to walk in the reserved grounds.

The Council had hopes of opening the Gardens to the public in the autumn of 1827, and drew up the first rules for admission :—

" That the Gardens be opened to the public every Wednesday and Saturday on the payment of 1*s.* each person.

" That Members be admitted at all times, subject to the usual regulations ; and may personally introduce on the private days two non-subscribers. If they wish to introduce any additional number of visitors, it must be at the rate of 2*s.* 6*d.* each.

" The Museum shall be opened on the same terms as the Gardens, the public days being Mondays and Thursdays.

" Every individual visiting the Gardens on private days is to enter his or her name in a book kept for that purpose."

The hopes, however, were disappointed, and the Gardens were not opened to the public until April 27, 1828. The rules for admission were suspended, and tickets were issued to Members, giving a free power of admission to themselves and friends, until a more detailed set of regulations should be laid before a General Meeting of the Society. Scherren, in his History, reproduces a ticket signed by John Wade, and states that it is the earliest form of ticket known. It cannot be earlier than 1829, however, as it describes " Members " as " Fellows," a designation that did not apply until the Charter was granted. I reproduce from a blank ticket in the possession of the Society an earlier admission form, signed by Yarrell, and an unsigned one of a later date, when the illustration was changed from time to time.

A lithographic sketch plan, prepared by Decimus Burton, showing the proposed lay-out of the Gardens and elevations of some of the aviaries and other erections, was approved in July, and copies were circulated. This, however, was propaganda, rather than actuality ; it remained only an ideal and very few of the actual details were adopted.

Dr. Horsfield, the Vice-Secretary, resigned, his "time being too fully occupied at the India House for other duties." Edward Turner Bennett was appointed in his place. Bennett (1797–1836), who afterwards became Secretary, was a surgeon and zoologist, oddly referred to in the Dictionary of National Biography as having "promoted the establishment of the Entomological Society, 1832, which afterwards became the Zoological Society of London." Permission was given to William Swainson (1789–1855) "to make drawings from such subjects in the Society's Museum and Menagerie as would forward the objects of the 'Encyclopædia of Natural History,' then in the press, the permission being the first of the Society's many practical contributions to the diffusion of knowledge of natural history.

In November, 1827, the Council decided to endeavour to obtain the grant of a Royal Charter, and Mr. Bicheno and Mr. Septimus Burton were requested to prepare a draft. There is no record of the subsequent negotiations, but in the minutes of the Meeting of Council of April 1, 1829, the following is entered :—

"A letter from the Secretary of State's Office was read, stating that the Charter of the Society was sealed and ready. The account of the fees on the same was at the same time submitted to the Council, and ordered to be paid, amounting to £326 12*s*. 8*d*."

At a General Meeting of the Society held in Bruton Street on April 29, 1829, it was briefly announced that the Society had become a Chartered Body, under the title of The Zoological Society of London, and the full

text was contained in the Report of the Council, issued to the Meeting, and reprinted as follows :—

"THE CHARTER OF THE ZOOLOGICAL SOCIETY OF LONDON.

"GEORGE THE FOURTH by the Grace of God of the United Kingdom of Great Britain and Ireland King, Defender of the Faith. To all to whom these Presents shall come greeting : Whereas several of our loving subjects are desirous of forming a Society for the advancement of Zoology and Animal Physiology, and the introduction of new and curious subjects of the Animal Kingdom ; and having subscribed and expended considerable sums of money for that purpose, have humbly besought Us to grant unto them, and to such other persons as shall be elected as hereinafter is mentioned, our Royal Charter of Incorporation for the better carrying on the same : Now therefore know ye, that We, being desirous to encourage so laudable an undertaking, have of our special grace, given and granted. And We do hereby give and grant, that our right trusty and entirely beloved Cousin and Councillor *Henry* Marquis of *Lansdowne*, our right trusty and well beloved *George* Lord *Auckland*, and our trusty and well beloved *Charles Baring Wall*, Esquire, *Joseph Sabine*, Esquire, and *Nicholas Aylward Vigors*, Esquire, and such others as shall from time to time be appointed and elected Fellows of the said Society in manner hereinafter directed, and their Successors, shall for ever hereafter be, by virtue of these presents, One Body Politic and Corporate by the name of 'THE ZOOLOGICAL SOCIETY OF LONDON,' for the purposes aforesaid, and by the name aforesaid, to have perpetual succession, and to have a Common Seal, with power and authority to alter, break and renew the same at their discretion ; and by the same name to sue, and be sued, to implead and be

Objects of the Society.

Incorporation

Corporate Name.

Common Seal.

To sue and be sued, &c.

impleaded, and answer and be answered unto, in every Court or Place of Us, our Heirs and Successors. And we do constitute and appoint, that the persons hereby incorporated, and their successors, shall be for ever able and capable in the law to purchase, receive and possess to them and their Successors any Goods and Chattels whatsoever, and (notwithstanding the statutes of Mortmain) to purchase, hold and enjoy to them and their successors any Lands, Tenements, and Hereditaments whatsoever, not exceeding at the time or times of puchasing such Lands, Tenements, and Hereditaments, respectively, the yearly value at a Rack Rent of Two Thousand Pounds in the whole. And We do hereby declare and grant that they the said *Henry* Marquis of *Lansdowne*, *George* Lord *Auckland*, *Charles Baring Wall*, *Joseph Sabine*, and *Nicholas Aylward Vigors*, shall be the first Fellows of the said Society; and that they or any three or more of them shall, and may, on or before the twenty-ninth day of April, One thousand eight hundred and twenty-nine, under their respective hands in writing, appoint such other persons to be Fellows, Honorary Members, Foreign Members, and Corresponding Members of the said Society, as they may think fit. And We do further declare and grant, that for the better government of the said Society, and for the better management of the Concerns thereof, there shall from the date of these presents, thenceforth and for ever, be a President, Treasurer, Secretary, and Council of the said Society; and that such Council shall consist of twenty-one Fellows of the said Society, whereof the President, Treasurer, and Secretary shall be three. And We do further declare, that the said *Henry* Marquis of *Lansdowne* shall be the first President, the said *Joseph Sabine* the first Treasurer, and the said *Nicholas Aylward Vigors* the first Secretary. And that they the said

Power to purchase Lands, &c., not exceeding at the time of purchase the yearly value at a Rack Rent of £2,000 in the whole.

First five Fellows of the Society named. Any three or more of them shall, on or before the 29th April, 1829, appoint other persons to be Members of the Society.

The Council to consist of 21 Fellows.

First President, Treasurer and Secretary named.

First Fellows, or any three of them, may appoint a Council.

Henry Marquis of *Lansdowne*, *George* Lord *Auckland*, *Charles Baring Wall*, *Joseph Sabine*, and *Nicholas Aylward Vigors*, or any three or more of them, shall, and may, under their respective hands, appoint such other discreet persons, being Fellows of the said Society, to be Members of the said Council, as they shall think fit, nevertheless so that the number thereof shall not exceed twenty-one.

First Council to continue until April 29, 1829.

And We do further declare, the aforesaid President, Treasurer, and Secretary hereby appointed, and the Council to be appointed as aforesaid, shall continue in such their respective offices until the twenty-ninth day of April One thousand eight hundred and twenty-nine.

The Fellows, or any eleven of them, shall, on the 29th of April in every year, remove, by ballot, five Members of the Council, and elect five other Fellows in their room. And also, remove or re-elect any other person who may have been elected during the year in the place of one dying or resigning.

And We do further direct, that the Fellows of the said Society, or any eleven or more of them, shall and may, on the said twenty-ninth day of April One thousand eight hundred and twenty-nine, and also shall and may on the twenty-ninth day of April, or as near thereto as conveniently may be, in every successive year, assemble together at the then last or other usual place of meeting of the said Society, and by method of Ballot remove from the then present Council five of the persons of whom it shall be composed; and also shall and may by the like method of Ballot elect five other persons, being Fellows of the said Society, into the Council, in the room and stead of those so removed, who, together with the persons not so removed, shall form the Council for the then next ensuing year; and also shall and may in like manner remove any other person from the said Council who may have been elected as hereinafter is provided, in the place of one dying or resigning, and in like manner may either elect another Fellow of the said Society in the room and stead of the one elected as aforesaid, or re-elect the one so elected.

The Fellows, or any eleven of them, may

And also that the Fellows of the said Society, or any eleven or more of them, shall and

From an Engraving lent by the Marquis of Lansdowne

THIRD MARQUIS OF LANSDOWNE, F.R.S.
President, 1827–1831

may, at the time and in manner aforesaid, by the like method of Ballot, elect from among the Members of the Council, when formed and elected in manner aforesaid, one person to be President, one person to be Treasurer, and one person to be Secretary of the said Society, for the year then next ensuing. And We do further declare and grant, that in case of the death or resignation of the President, Treasurer, or Secretary, or of any other Member of the Council for the time being of the said Society, the Members for the time being of the Council of the said Society, or any five or more of them (the whole having been duly summoned), shall and may from time to time, within the space of three Calendar Months next after such death or resignation, or as near thereto as conveniently may be, by method of Ballot elect some other person being a Fellow of the said Society, to supply the place of such President, Treasurer, or Secretary, or other Member of the Council so dying or resigning; and the person so elected shall be and remain a Member of the Council of the said Society, and President, Treasurer, or Secretary, as the case may be, until the next Annual General Meeting of the said Society ensuing such election. And We do further will and declare, that the President for the time being so soon after his appointment as conveniently may be, shall and may nominate and appoint any number of persons, being Members of the said Council, not exceeding six, to be Vice-Presidents of the said Society for the year ensuing; and in case of the death or resignation of any person so appointed, he shall and may nominate and appoint any other person, being a Member of the Council, in the room or stead of the person so dying or resigning, for the remainder of the year then ensuing. And We do further declare and grant, that from and after the said twenty-ninth day of

elect from amongst the Council a President, Treasurer, and Secretary for the ensuing year.

The Council or any five of them, may within three months, fill up any vacancy in the Council occasioned by death or resignation.

President to appoint six Members of Council to be Vice-Presidents for the ensuing year.

April, One thousand eight hundred and twenty-nine, the Fellows of the said Society, or any eleven or more of them, shall and may have the power from time to time, at the General Meetings of the said Society, to elect by method of Ballot such persons to be Fellows, Honorary Members, Foreign Members, and Corresponding Members of the said Society, and such Fellows, Honorary Members, Foreign Members and Corresponding Members to remove from the said Society, as they shall think fit. And We do further declare and grant, that the Council of the said Society for the time being, or any five or more of them (the whole having been duly summoned), shall and may from time to time nominate and appoint such persons as they shall think proper, to be Officers and Servants for carrying on and executing the necessary concerns of the said Society; and such Officers and Servants to remove as they shall see occasion; and also shall and may have power, according to the best of their judgment and discretion, to make and establish such Orders and By-Laws as shall appear to them useful for the regulation of the said Society, for the management of the Estates, Goods, Lands, Revenues, and Businesses thereof, and for fixing and determining the times and places of meeting of the said Society, and also the times, place, and manner of electing, appointing, and removing all Fellows, Honorary Members, Foreign Members, and Corresponding Members of the said Society, and for regulating and ascertaining as well the rights, privileges, and advantages, as the qualifications of persons to become Fellows, Honorary Members, Foreign Members, and Corresponding Members of the said Society respectively, and also the sum and sums of money to be paid by them respectively, whether upon admissions or otherwise, towards carrying on the purposes of the said Society; and the same

Fellows, or any eleven of them, to have the power of electing and removing Members at General Meetings.

Council, or any five of them (the whole having been summoned), to appoint and remove Officers and Servants.

Council, or any five of them, to make Orders and By-Laws—and to alter, suspend, or repeal the same.

Orders and By-Laws from time to time, as they may see occasion, to alter, suspend, or repeal, and to make such new Orders and By-Laws in their stead as they shall think most proper and expedient, so as the same be not repugnant to these Presents, or the Laws of this our Realm. Provided that no By-Laws to be made, or alteration or repeal of any By-law shall be considered to have passed and be binding on the said Society until notice of such By-Laws or such alteration or repeal of any By-Law shall have been publicly given at a General Meeting, nor until the same shall have been hung up in writing in some conspicuous place in the common Meeting-room of the said Society during the space of three calendar months, nor until the same shall have been confirmed by method of Ballot by the Fellows of the said Society, or any eleven or more of them, at the next General Meeting of the said Society, to take place after such notices shall have been given as aforesaid.— In witness whereof we have caused these our Letters to be made Patent. Witness ourself at our Palace at Westminster this twenty-seventh day of March in the tenth year of our Reign.

Notice of By-Laws to be made, altered, or repealed, to be publicly given at a General Meeting. To be suspended for 3 months in the Meeting-room, and confirmed by ballot by eleven or more Fellows at the next General Meeting after notice as aforesaid.

" (By Writ of Privy Seal.)
" SCOTT."

The Charter has given the Society full scope in its century of existence, and no sufficient reason has appeared to apply for its modification. The suggestion has been made repeatedly to petition for a change of name from The Zoological Society to The Royal Zoological Society, but the shorter title has acquired the sanction of time, gives us and our Scientific Proceedings a more distinctive place in alphabetical lists, and occupies less space in citation. The Council's almost supreme power over the affairs of the Society has been challenged in the Law Courts by Fellows with a grievance on more than one occasion, but has always

been sustained. The model on which the draft was based plainly was found in the constitution of a Society in which scientific affairs were of greater importance than financial affairs. The Council was envisaged as a body of dignified persons who should conduct the affairs of the Society much as a landowner conducts his estate, leaving details to minor, paid officials, the Treasurer holding the funds and the Secretary conducting the scientific correspondence. Before long it was found that constant attention to the growing affairs of the Society was required from at least one officer with the authority of a Member of Council. Five successive Secretaries retired after comparatively short tenures of office, and in 1847, when the sixth, David William Mitchell, was appointed, a salary was attached to the post. The circumstance that the chief executive officer of what grew into an engrossing administrative and scientific post should be subject to annual re-election by the whole body of Fellows, and so have less security of tenure than his subordinates, is an odd anomaly, which, however, in the English way, has worked satisfactorily.

The Charter gave the Society power to make By-laws, although by an oversight rectified in the Zoological Society of London Act, 1928, these were binding on Fellows but had no legal force over other visitors to the Gardens. The Council prepared and circulated to Fellows in July, 1829, a first draft of the proposed By-laws for the regulation of the affairs of the Society. Although these were amended in certain respects before they were adopted by the Society in 1831, I print them here to show their close correspondence with the By-laws under which we work nearly a century later:—

"BYE-LAWS" CIRCULATED IN 1829.

"CHAPTER I.

"*Of the Fellows.*

"Section I.—Every candidate for admission as a Fellow of the Society shall be proposed and recommended

by three or more Fellows, who shall, at an Ordinary General Meeting of the Society, cause to be delivered to the Secretary, a paper signed by themselves, signifying the name, rank, occupation and usual place of residence of such person ; all of which shall be certified from the personal acquaintance of at least one of the recommending Fellows with the candidate.

" Section II.—Every certificate having been read at one of the Ordinary General Meetings, shall be hung up in the common Meeting Room of the Society ; and the person therein recommended shall be balloted for at the next Ordinary General Meeting which shall occur after such reading.

" Section III.—No person shall be declared to be elected unless he or she have in his or her favour two-thirds of the number of Fellows balloting.

" Section IV.—Every person so elected shall have immediate notice thereof given to him or her by the Secretary.

" Section V.—No person shall be deemed to be a Fellow until he or she shall have paid the Admission Fee and Contribution for the current year ; or have compounded for the annual payments.

" Section VI.—The Admission Fee shall be £5, the Annual Contribution £2, and the composition in lieu of the Annual Contribution £20 ; but no Fellow elected on or after the 1st day of October in any year shall pay the Annual Contribution for the current year.

" Section VII.—The payment of the Admission Fee shall be considered as distinctly implying the acquiescence of every Fellow elected into the Society, in all the Rules, Regulations and By-laws of the Society.

" Section VIII.—If any Fellow shall fail to pay the Annual Contribution on the 1st of January in every year, or within three months after, the name of such Fellow shall be suspended in the common Meeting Room, as that of a defaulter ; and the Council shall be empowered

to prevent such Fellow from exercising his or her privileges: Provided nevertheless that the Council shall have authority to restore such defaulter to his or her privileges upon payment of arrears.

"Section IX.—The Council shall have power to remit the Admission and Annual Fees, or any part thereof, or allow further time for payment of the same, where they shall see special cause for such remission.

"CHAPTER II.

"*Withdrawing and Removal of Fellows.*

"Section I.—Every Fellow having paid all fees due to the Society shall be at liberty to withdraw from the Society upon giving notice thereof in writing to the President or Secretary.

"Section II.—Whenever it shall be proposed to remove any Fellow from the Society, the same shall be done by a Resolution of Council, which shall be read at three successive Ordinary General Meetings of the Society, at the last of which the proposition shall be balloted for; and if eleven or more Fellows shall ballot, and two-thirds of the Fellows balloting shall vote that such Fellow be removed, he or she shall be removed from the Society accordingly.

"CHAPTER III.

"*Privileges of Fellows.*

"Section I.—Fellows have the right to be present and to vote at all General Meetings; to propose candidates for admission into the Society as Fellows; to introduce visitors at General Meetings; and, under such regulations and restrictions as the Council may deem expedient, to have personal access to the Gardens, Vivarium, Museum and other places of a like nature in the occupation of the Society; as also to introduce,

either in person or by letter, visitors to the same, according to the regulations of Council.

" CHAPTER IV.

" *Of Honorary Members.*

" Section I.—The Honorary Members of the Society shall be eminent and distinguished persons, subjects of the United Kingdom, and zealous patrons of Zoology.

" Section II.—Every person proposed as an Honorary Member shall be recommended by the Council, and his recommendation shall be read and suspended; and he shall be balloted for and elected, in the like form and manner, and be subject to the same rules and regulations, as in the case of Fellows. Honorary Members shall be exempted from the payment of fees and contributions: they shall have the privilege of attending the Meetings, introducing strangers, and visiting the Vivarium and Museum, and other similar places open to Fellows; but they shall not be entitled to vote at the Meetings of the Society, nor enjoy any other rights or privileges than those above mentioned.

" CHAPTER V.

" *Foreign Members.*

" Section I.—Every foreigner, not being domiciled in Great Britain, who has distinguished himself as a Zoologist, or who has shown himself able and willing to promote the ends for which the Society is founded, may be elected a Foreign Member: provided that the number of such Foreign Members do not exceed twenty-five.

" Section II.—Every person proposed to the Society as a Foreign Member, shall be elected in the like form and manner, and be subject to the same rules and regulations as Honorary Members.

" Section III.—Foreign Members shall be entitled to the same privileges as Honorary Members.

" CHAPTER VI.

" *Corresponding Members.*

" Section I.—The Corresponding Members of the Society shall be constituted of such persons as may show a willingness to promote the ends of the Society, and shall be elected as such in like form and manner, and be subject to the same rules and regulations as Honorary and Foreign Members.

" Section II.—Corresponding Members shall enjoy the same privileges as Honorary and Foreign Members.

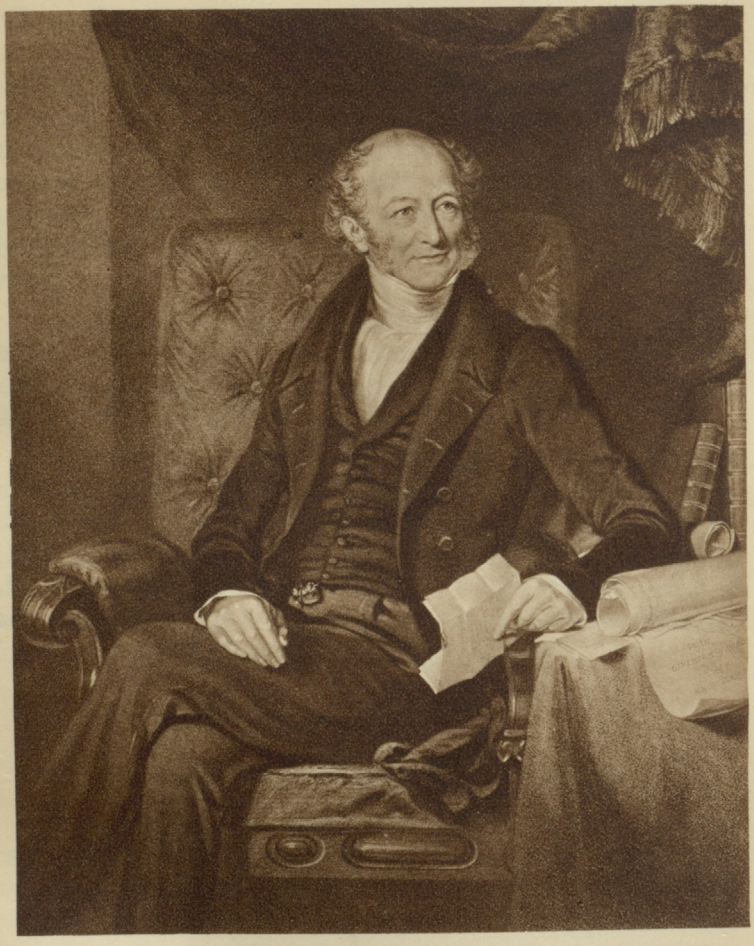
" CHAPTER VII.

" *Of the Election of the Council and Officers.*

" Section I.—Notice of the time and place of the Annual General Meeting shall be advertised by the Council in four or more of the public newspapers, at least one week before the same shall take place.

" Section II.—The Council for the time being shall, before the day of election, cause to be prepared a sufficient number of printed balloting lists, according to the annexed form in the schedule ; one of which (No. 1) is to contain the names of such Fellows as they shall recommend to be removed from and elected into the Council ; and the other (No. 2) is to contain the names of such persons as they shall recommend to fill the offices of President, Treasurer, Secretary and Vice-Secretary, for the year ensuing.

" Section III.—On the day of election the Fellows present shall deliver to the person in the Chair his balloting list or lists, who shall put such list or lists into the respective balloting glasses to be provided for the occasion. The person in the Chair shall appoint two or more scrutineers, being Fellows present not members of the Council, to superintend the ballots and report the results to the Meeting.



F. C. Lewis, Engr.

LORD STANLEY, K.G., D.C.L.
(FOURTEENTH EARL OF DERBY)
President, 1831–1851

" Section IV.—If any Fellow should not approve of the Fellows nominated in such balloting lists to fill the offices therein mentioned, but be desirous of giving his or her vote to some other Fellow or Fellows, he or she shall strike the pen through the printed name or names of the Fellow or Fellows of whom they may disapprove, and shall write over and against such printed name or names, on the blank side left and prepared for that purpose, the name or names of any other Fellow or Fellows for whom they may be desirous to give their vote.

" Section V.—The ballot for the Council shall remain open for the space of one hour ; and the ballot for the Officers for one half-hour after the result of the ballot for the Council shall have been declared.

" Section VI.—If, from any cause, an election shall not take place of persons to fill the Council or any of the offices aforesaid, then the election of the Council and Officers, or the election of Officers as the case may be, shall be adjourned until the next convenient day, of which notice shall be given in like manner as is directed for the Annual General Meeting.

" CHAPTER VIII.

" *Of the President and Vice-Presidents.*

" Section I.—The business of the President shall be to preside at all the meetings of the Society and Council, and regulate all the debates therein ; and generally to execute or see to the execution of the By-laws and Orders of the Society.

" Section II.—In case of his absence from any of the Meetings of the Society or Council, his place shall be filled up by one of the Vice-Presidents (preference being given to the Vice-President being the oldest member of the Society), or by a Member of Council then present, who shall for the time have all the authority, privilege and power of the President. If no Member of Council

shall be present at any Ordinary General Meeting, then the Fellows present shall nominate and appoint to be Chairman such discreet and proper person, being a Fellow, as they shall see fit.

" CHAPTER IX.

" *Of the Treasurer.*

" Section I.—The Treasurer, or his deputy under his direction, shall demand and receive to the use of the Society, all moneys or sums of money due or payable to the Society, and out of such moneys shall pay and disburse all moneys or sums of money due from or payable by the Society, upon all occasions, and shall keep full and particular accounts of all such receipts and payments.

" Section II.—An account in the name of the Society shall be opened, and all the moneys shall be deposited by the Treasurer at a Banker's to be approved of by the Council.

" Section III.—Every sum of money exceeding £5 shall be paid by an order made in Council.

" Section IV.—The Treasurer shall have under his direction a Clerk to be appointed by the Council, who shall make entries of the particulars of all sums of money received and disbursed, and who shall open an account with every Fellow of the Society, stating the several sums payable by him, and of the times of payment of the same, and also of the moneys received and disbursed in the several departments belonging to the Society : all which books and vouchers for entry shall be open to the inspection of every Fellow on application to the Council.

" Section V.—The accounts of the Treasurer shall be made up to the end of every year, and be audited the day fortnight, or thereabouts, preceding the anniversary meeting, by a Committee to be appointed at an Ordinary General Meeting, and to consist of three

Members of the Council, and of five Fellows of the Society not Members of the Council; three of the said Committee to be a quorum.

Section VI.—The Committee of Accounts shall make their Report to the Society upon the day of the Annual General Meeting, stating not only the balance in the Treasurer's hands, but also the general state of the Funds of the Society; and the report, or an abstract thereof, shall be printed for distribution among the Fellows of the Society.

" CHAPTER X.

" *Of the Secretary and Vice-Secretary.*

" Section I.—The Secretary, and in his absence the Vice-Secretary, shall have inspection over the Assistant-Secretary, Clerks, Gardeners, Keepers and other the servants of the Society, and shall give the necessary orders and directions concerning the several departments in their care, and shall see generally that the By-laws and Orders of the Society and Council be executed.

" Section II.—The Secretary shall attend at all Meetings of the Society, Council or Committees, when he shall take minutes of the business and orders of the Meeting, to be entered afterwards in a fair manner in the respective books to which they may relate.

" Section III.—The Secretary shall conduct the correspondence of the Society, and shall have the immediate charge and custody of the books, papers and writings belonging to the Society.

" Section IV.—In case of the unavoidable absence of the Secretary from any Meeting of Council, some Member of Council shall act for him.

" CHAPTER XI.

" *Of the Clerks, Keepers and Servants.*

" Section I.—The Assistant-Secretary, Clerks, Keepers, and other the servants of the Society, shall

be subject to the orders of the Council, also of the President, Treasurer or Secretary. The amount of their respective salaries and duties shall be settled by the Council. They may be dismissed from the service of the Society by the Council, or by the President, Treasurer or Secretary, who shall report the same to the Council. They shall not under any pretence whatever receive any perquisite or profit from their connection with the Society, excepting what shall be expressly allowed by the Council; and any misconduct in this particular shall subject them to immediate dismissal.

" Section II.—Every servant of the Society receiving or paying money on behalf of the Society, shall be required before he enters upon the duties of his office to give security for the due execution thereof, in such penalty and with such surety or sureties as the Council may deem exepdient.

" CHAPTER XII.

" *Of the Ordinary General Meetings of the Society.*

" Section I.—The Ordinary General Meetings of the Society shall be held on the first Thursday in every month in the year, beginning at 3 o'clock p.m., or at such other time as the Council shall direct.

" Section II.—No stranger shall be permitted to be present during the Meeting, unless by permission of the President on the recommendation of some Fellow.

" Section III.—The course of business after the President has taken the Chair, shall be as follows: 1st, the names of the strangers present shall be notified; 2nd, the proceedings of the preceding Meeting shall be read; 3rd, a report shall be made by the Council, giving an account of the proceedings in the several departments since the last Ordinary General Meeting; of the presents which have been received since that time (such presents, when convenient, to be exhibited); an abstract of the Treasurer's Account current of

receipts and disbursements, together with any notification on matters of science which may appear to the Council worthy of the attention of the Society; 4th, ballots for the election of Fellows and other Members shall take place; and, lastly, recommendations of candidates for ballot shall be announced.

"Section IV.—When any questions not relating to elections or the regulations of the Society shall be proposed for the consideration of the Society, it shall be fairly transcribed on paper; and being signed by six or more Fellows, it shall be by them delivered to the Secretary at a Meeting of the Society; and shall thereupon be read from the Chair in due course; and after having been marked by the Secretary with the date of the day when delivered, it shall be fixed up in the Meeting Room of the Society; and at the Ordinary General Meeting next following the Meeting at which such notice shall have been read, it shall be put to the vote, or ballot if demanded, unless those who have signed such notice shall agree to withdraw it.

"CHAPTER XIII.

"*Of the Council.*

"Section I.—The Government of the Society, and the Management of its estates, goods, lands, revenues and businesses belong to the Council.

"Section II.—The Council shall meet at such times as shall be appointed by the President, or in his absence by one of the Vice-Presidents, Treasurer or Secretary due and sufficient notice being previously sent to every Member.

"Section III.—Should any question of science which may require particular attention come before the Society, the Council shall nominate one or more persons to examine and consider the same, who shall report thereon at the first convenient Ordinary General Meeting.

"Section IV.—No business shall be transacted in Council unless there be five or more Members present.

"Section V.—The ordinary method of voting in Council shall be by show of hands; but a ballot shall be taken in cases prescribed by any regulations of the Council, or when demanded by any Member present.

"Section VI.—The majority of votes shall decide every question; and in case of an equality of votes, the question shall be adjourned.

"Section VII.—Any Member of Council who shall be personally interested in the question before the Council, shall withdraw during the consideration and decision of the same.

"Section VIII.—The Council shall have power from time to time to make such regulations, and issue such orders respecting the admission of Fellows, Honorary Members, Foreign Members, and Corresponding Members to the Gardens, Vivarium, Museum and other similar places occupied by the Society, as shall appear to them conducive to good government.

"Section IX.—The Council shall present, and cause to be read to the Annual General Meeting, a Report on the general concerns of the Society for the preceding year, and such Report shall be printed, entire or abridged, under the direction of the Council, and transmitted to the Fellows residing within the limits of the threepenny post.

"CHAPTER XIV.

"*Of the Common Seal and Deeds.*

"Section I.—Every deed or writing to which the Common Seal shall be affixed shall be passed and sealed in Council, and signed by the President or Vice-President in the Chair, and countersigned by the Secretary."

Most of the changes made whilst the regulations were under discussion were insignificant. The spelling was changed from "Bye-law" to "By-Law." The word "rank" in the specification of candidates for the Fellowship was replaced by "description." The annual contribution of all Fellows elected after 1832 was raised from £2 to £3, an amount which has been retained up to the present, notwithstanding the reduced value of money. The number of Honorary Members was limited to twelve and Corresponding Members were to be persons living neither in London nor within fifty miles of it. If there were to be opposition to the Council's nomination of Officers or proposals for change in its own membership, notice in writing had to be given seven days before the Annual Meeting, and the Council had to prepare two balloting lists, one with its own proposals in red ink and another with the alternative proposals in black. The change, whilst making the procedure more precise, in fact established the dominance of the Council firmly, as it secured notice of any proposed opposition in time to prepare for it. In actual fact, during the century of the Society's existence, opposition to the Council's proposals has been made only once and that in relation to the election of the Secretary in 1903 when the Council was known to be divided, and the opposition was successful. The system of Council election prescribed by the Charter and detailed in the By-laws has secured continuity of policy, but, as a scrutiny of the names of successive Councils shows, has tended to confine membership to a close ring, the five who retired in any year rather frequently being re-elected after the lapse of one year. In 1912, however, the Council passed a standing order to the effect that each year when it was selecting the five Fellows to be recommended to fill the five vacancies, at least one name should be that of a Fellow who had never served before. Since that time there has been a constant stream of new blood. The annual audit of the accounts was placed entirely in the hands

of Fellows, as the seven auditors to be elected at a General Meeting were to be neither Members of Council nor to be elected into the Council during the ensuing year.

There was one remarkable alteration on which it would be interesting to know the considerations which were brought forward, but of these, however, there is no record. There was no restriction as to sex in the Charter, and the draft By-laws insisted on equality by using the alternatives "he" and "she," "his" and "her" in relation to candidates for the Fellowship and in the voting of Fellows at meetings. In the By-laws as adopted, it was laid down that "Ladies may be admitted as Fellows upon the same terms, with the same privileges, and under the same regulations in all respects as gentlemen." Apparently, although their subscriptions were accepted and their presence in the Museum and Gardens welcomed, they were not expected to attend meetings of the Society. The following odd section was placed in the Chapter relating to the privileges of Fellows :—

"Ladies who are Fellows of the Society have the right to vote by proxy at all General Meetings ; having previously announced to the Secretary, in writing, their appointment of any gentleman being a Fellow of the Society, to be their proxy, who shall be registered as such accordingly, but who shall not be changed within the year, unless in the event of his ceasing to be a Fellow."

Many years afterwards, when the clause about proxies had given rise to high dispute, the restriction was removed and all Fellows now enjoy full equality in theory and practice. It is of interest to recall that the Zoological Society a century ago admitted women as Fellows, although apparently not without heart-searching. The Linnean Society followed, but more than half a century later, and then, it is believed, chiefly

National Portrait Gallery

H.R.H. The Prince Consort
President, 1851–1862

from a reluctant compliance with financial needs. The Royal Society remains firmly male.

The Charter gave power to the Society to alter its By-laws, after due notice had been given, by ballot of the Fellows at an Ordinary General Meeting. Many changes have been made in the course of the century the discussion of which, in detail, would be tedious. The Council was given power to remit the admission fee and subscription of Fellows on their election. The life composition was raised to £45. The procedure for removing Fellows in arrears was laid down. Fellows about to reside permanently out of Great Britain were allowed to go on a " Dormant List " and pay a reduced subscription. A clause forbidding the Society from distributing dividends or bonuses to its Fellows was introduced. As the Honorary Membership was confined to subjects of the United Kingdom and the Foreign Membership to foreigners, a new class of Imperial Fellows was instituted to provide for recognition of " zealous patrons of Zoology, of high esteem and position in India, or a British Dominion, Colony or Protectorate, but not eligible for election as Honorary or Foreign Members, the number not to exceed twelve." The Corresponding Membership was at first restricted to persons not residing in Great Britain or Ireland, and limited to 200. Later on, to provide for young professional zoologists who might desire to avail themselves of the scientific privileges of the Fellowship and find the admission fee and annual contribution a burden, the number was raised to 350, and persons resident in Great Britain and Ireland became eligible under conditions requiring evidence of their scientific status and qualifications.

The more important of these alterations and amendments were made during the last twenty years, but at a much earlier period changes of another kind were incorporated in By-laws. The original intention had been for scientific business to be taken at the Ordinary

Meetings of the Society and for zoological specimens to be exhibited and discussed at them. But a division took place between Ordinary Meetings and Meetings for Scientific Business, and the Society began its series of scientific publications. Rules governing the procedure at the scientific meetings and of the election and duties of a Committee of Publications were drawn up and incorporated in special By-laws.

Chapter III.

OFFICES AND OFFICERS.

Within the limits of the Charter and By-laws, the organisation of the Society developed during the century in correspondence with the expansion of its membership and work. There were several changes of its offices. The first headquarters were at 33, Bruton Street, which provided offices, meeting room, museum, accommodation for some living animals (and a dissecting room, for Owen, afterwards Sir Richard Owen, dissected an ostrich there), from 1826 to 1836. In the latter year a larger house was taken at 28, Leicester Square, a former residence of John Hunter, who had his Museum there. The growth of the Museum, however, rapidly outran the accommodation, and in 1841 the lease of the house in Leicester Square was given up, the collections were stored in a warehouse in Dufour's Place, near Golden Square. The history of the Museum is set forth later in this volume (p. 96). Offices were taken for the Society at 57, Pall Mall, until 1843, when No. 11, Hanover Square, was taken on lease. The house was commodious, and it was possible to provide a Secretary's office which also contained the growing library, a Council room, ornamented with some of the more showy specimens of the Collection, and a meeting room. At the same time the greater part of the Museum Collection was removed to the Gardens, where it was exhibited in a house in the North Garden, first designed for Carnivora. The Society remained at 11, Hanover Square, for many years, acquiring the freehold in 1877, together with that of a house contiguous with it, but facing Oxford Street. It outgrew the accommodation, and in 1883 the freehold of No. 3, Hanover Square, was purchased for £16,250

and £10,000 was expended on repairs and alterations, including elaborate oak shelves, table cases and cupboards for the library. The house was conveniently situated, but the alterations had not been sufficiently extensive to support the enormous and growing weight of a large library on the first floor. Soon after I became Secretary of the Society, in 1903, I became disturbed about the stability of the premises, a feeling that became alarm a few years later when a fire in the adjoining premises showed that the party wall was flimsy and that the floors were insufficiently supported. At the same time I had become convinced that the geographical separation between the Offices and the Gardens was detrimental both to the scientific and the practical interests of the Society. I proposed a scheme in 1908, and eventually convinced the Council, with the strong support of the President, of the advantage of selling the freehold and with the proceeds constructing the present offices, library and meeting room on a site at the Gardens, as well as carrying out improvements in the Gardens. There was a violent campaign of opposition, some of it merely obstructive, some based on a genuine concern lest the scientific interests of the Society should suffer from the removal of the library and the scientific meetings from central London. The more substantial point was raised that it was an unwise proceeding to invest the proceeds of a genuine asset in building on land held on an annual tenancy. At a private meeting of the Fellows who habitually attended the scientific meetings, I explained the whole position and secured the support of the great majority. A few months later, at a Special General Meeting of the whole Society (April 29, 1909), the scheme was carried by a very large majority. Still further delay was caused by a single Member of Council who succeeded in " bluffing " a perhaps not unwilling majority of Council into the belief that there were legal obstacles to the sale. A Chancery Judge, however, quickly disposed of this factious opposition and declared

the transaction to be legal and in the interests of the Society. The construction of the new offices was begun in autumn, 1909. The old office in Hanover Square was closed at 2 p.m. on Saturday, July 9, 1910, and the new offices at the Gardens were opened at 10 a.m. on Monday, July 11, 1910. The library took some weeks to transfer and rearrange, but this required only an extension of the usual annual month of closing for cleaning.

The Council has remained throughout the Governing Body of the Society and the many volumes of Minutes of their Meetings show that the duties have always been taken seriously, even minor details being discussed at length. The successive Presidents, in consequence, have had great responsibilities, and the records show that most of them attended regularly both at full meetings of the Governing Body and at meetings of Committees for special purposes. Sir Stamford Raffles, as I have already related, was more responsible than any other individual for the form which the Society took. The Marquis of Lansdowne, his successor, (1827–31) conducted the necessary steps for obtaining a Royal Charter, was the intermediary through whom King William IV consented to become Patron, a Royal favour subsequently extended by Queen Victoria, King Edward and the present Sovereign. It was largely through his powerful influence, moreover, that land in Regent's Park was granted. Lord Stanley, afterwards Earl of Derby (1831–51), took a most active interest in the development of the Gardens and was an extremely generous donor to the Collection. During the Presidency of the Prince Consort, H.R.H. was able to nominate a set of distinguished and effective Vice-Presidents who performed the duties which the other calls on his time compelled him to leave to them. Sir George Clerk (1862–68), originally a Scottish advocate who entered Parliament, and was a Lord of the Admiralty, Under-Secretary of State for Home Affairs and Master of the Mint, was an extremely regular occupant of the

Presidential Chair until his death in 1867. The Viscount Walden (afterwards Marquess of Tweeddale) (1868–78) was a highly distinguished ornithologist who paid great attention to the Library and to the Collection of Birds. Professor Flower (afterwards Sir William Flower) (1879–99), Hunterian Curator and Professor at the Museum of the Royal College of Surgeons when he became President of the Society, afterwards Director of the British Museum (Natural History), hardly ever missed a Meeting of the Council or of the Society's meetings for scientific or general business. He took a keen interest in all the affairs, but naturally was most devoted to the purely scientific side. I find it difficult to speak adequately of the Duke of Bedford, President since 1899. His great generosity to the Society, his wide practical knowledge of zoology, especially of mammals and birds, and his skilled conducting of meetings (not always peaceful) of the Society are known to all the Fellows. But I have had the good fortune to serve on the Council of the Society during the greater part of his Presidency (as an ordinary Member since 1900, and as Secretary since 1903) and I know that a great part of our growing prosperity has been due to his quiet initiative, wisdom and spirit of enterprise.

Joseph Sabine, Treasurer of the Society from its institution until 1830, was a Fellow of the Royal Society, a leading horticulturlist and deeply interested in what was then called "animal physiology," that is to say the qualities of living animals including breeding, reaction to environment, and so on, as opposed to museum zoology. The records show that at every Meeting of Council he performed the ordinary duties of treasurer and financial manager, explaining the state of the bank account, presenting and certifying bills, and so forth. But he also took a very large part, a much larger part than Vigors, the Secretary, in the management of the Gardens, hiring and discharging staff, inspecting and recommending purchases of animals,

stores, implements and food, and bringing up plans for new houses and enclosures, the making of paths and so on. He also was largely responsible for an enterprise which, as will presently be described, came to an unhappy end, a farm at Richmond for breeding and acclimatisation. He was an energetic voluntary officer, but it would appear that he was either careless or inexperienced in the keeping of accounts, and various troubles are recorded. A minute was passed not very long after he had become Treasurer ordering the appointment of a "proper accountant" to post and arrange in a methodical manner the accounts of the Society. Early in 1830, a paid Assistant-Secretary was appointed and he took over the accounts and finance with the assistance of a small committee of Council. Sabine resigned the Treasurership before the annual meeting of 1830, and a minute of Council was passed thanking him for his services. His successor, James Morrison, served as Treasurer only for a year and I can find no trace of his even having attended a meeting of Council. He appears to have been a very wealthy politician and something of a reformer, but his activities as a Member of Parliament and the forwarding of railway legislation absorbed his attention. He was succeeded by Charles Drummond, the banker, who was Treasurer from 1831 to 1858, to be succeeded first by his son, Robert Drummond (1858–81), and then by his grandson, Charles Drummond, the present Treasurer, who has held the office since 1881. For nearly a century the Drummonds have been a strong support to the Society, placing the resources of their bank at its disposal on a most liberal scale, holding its securities, advising on investments, and, when the need arose, making advances or loans on generous terms. But since the resignation of Sabine, the successive Treasurers, except in so far as they were Members of Council, ceased to take part in the routine administration of the affairs of the Society, which passed into the hands, first of the Secretary and Assistant Secretary and then, on the

transformation of the secretaryship in 1847 into a paid office, wholly into the hands of the Secretary. Although the Treasurers acted in a sense as Trustees of the Society, holding its monetary assets and advising on high policy, the routine work of keeping the accounts was a necessary and arduous duty. In this, as in many other respects, we have been fortunate in the service we have received. The Accountant for many years was J. H. Leigh, who retired in 1878, after no less than fifty years in the service of the Society. At the Annual General Meeting in that year he was presented with a gold watch and chain in commemoration of his long and faithful services. He was succeeded by John Barrow, who had already been nine years his assistant. Barrow retired in 1919, after having served forty years as Accountant, and nearly fifty years if his time as Assistant is reckoned. Many Fellows must remember his amiable character, and I can bear full witness to his assiduous care in the performance of his duties. It has been the tradition of the Society that the Accountant should be more than the simple guardian of daily expenditure and receipts. He has acted as a kind of confidential agent of the Secretary, an intermediary between him and the rest of the staff, in all matters of routine, the custodian of the Minutes of the Council and Committees, and therefore fully acquainted with all the business. Mr. Barrow was the soul of diligence and discretion, and, during the War, when his age might well have entitled him to retire, he cheerfully carried on, accepting even more than his usual duties. When, in November, 1919, he was awarded a pension, he left with the goodwill of everyone who had been associated with him.

In Barrow's time the Accountant's work had increased with the growth of the Society so that several assistants were necessary. Of these, F. W. Bond, the present Accountant, entered the office as a junior clerk in 1903, became assistant to the Accountant in 1908, was appointed definitely Accountant's Assistant in

Thos. Lupton, Engr.

SIR GEORGE CLERK, BT., F.R.S.
President, 1862–1868

1912. In November, 1914, he asked leave to join the Army, but at that time it was almost impossible to spare him, the more so as he was undertaking the work of several who were at the front. In the beginning of 1917 he joined the Army and soon afterwards went on active service, being rapidly promoted. He was demobilised in 1919, having reached the rank of Sergeant-Major, and on Barrow's resignation was appointed Accountant. Mr. Bond thus came to us at the time when the very rapid increase in our affairs began, and has grown up with our prosperity, his duties increasing all the time. He knows all the routine of our affairs, which in any way concerns finance, and, without his shrewd and steady judgment of men and affairs, the task of the Secretary would have been more difficult.

Next to the Accountant in the office organisation come the chief clerk and his staff, who attend to all the business connected with tickets, circulars, enquiries and so forth, and who keep track of the Fellows, a task which has only been possible with the growing numbers since we introduced a card-catalogue system, with a card for each Fellow. The two chief clerks of whom I have had personal experience are W. H. Cole, who retired on pension in 1923 after nearly forty-five years' service, and his successor, W. C. Harris, who succeeded Cole, and who has been with us since 1907 except for his war service in the Navy. Apart from their exemplary carrying out of their duties each of these has had a marvellous memory for faces and for handwriting, a quality often of fundamental usefulness to us. Harris's chief assistant is G. R. Doubleday, who has a historical connection with the Society, as his father, George A. Doubleday, died in 1907 after twenty-four years' service, first as clerk in the library and then as clerk in charge of publications.

I have been surprised to find how small a part would be ascribed to Nicholas Aylward Vigors, the first

Secretary, were his claim to having shared in the formation of the Society based on the actual records. Vigors was the son of an Irish country gentleman and was educated at Trinity College, Oxford, where he devoted himself to Classics, a bent which explains his frequent references to Latin and Greek poets in his zoological papers. He purchased an ensigncy in the Grenadier Guards, fought in the Peninsular War, and, after being severely wounded, returned to England, left the army and devoted himself to ornithology and entomology, in which he made extensive collections, subsequently presenting them to the Museum of the Zoological Society. He published many papers chiefly dealing with the classification of birds. He had been attracted by the ideas of W. S. Macleay, who, in *Horæ Entomologicæ* (1819), had developed a system of arranging animals and plants based on their resemblances or affinities rather than on their differences. This became known as the "Quinary System" because it attempted to arrange not only the animal and vegetable kingdoms as wholes, but their sub-divisions, in circles of five. It was partly transcendental, but was developed with high ingenuity and wide knowledge and had many curious previsions of evolutionary doctrines. Vigors applied the principle of sub-division into fives in a mechanical way, and unwittingly did systematic zoology the service of showing that it could not hold the facts. Without doubt, however, Vigors held a considerable position amongst zoologists and in the social world, and doubtless the fact that he was Secretary was a support in the early days of the Society. He attended Council Meetings regularly and signed notices that were issued to Fellows and the public. He took a zealous part in the development of the Museum and, in association with Dr. Horsfield, published descriptions of mammals new to science. But his name rarely occurs in the Minutes, and he appears to have taken no part in the negotiations for the Charter, in the drafting of the Constitution, in the Farm or Gardens. When his

father died in 1832, he succeeded to the family estates, resigned the secretaryship of the Society and became M.P. for Carlow.

The second Secretary, Edward T. Bennett (1833–36), was a naturalist of much greater distinction and a skilled anatomist. Bennett had succeeded Horsfield as Vice-Secretary and the records show that he had taken an active and vigorous part in all the affairs of the Society. This was fully recognised by the Council, and on May 15, 1833, a resolution was passed giving him a salary of £200 in "compensation for the time necessarily occupied by the duties of the Secretaryship." This, however, he declined to take. He was the founder of the Society's Library, presenting 200 volumes from his own collection. Under his care the Society's "Scientific Proceedings" assumed the form in which, with minor alterations, they have retained up to the present, and the first part of the "Scientific Transactions," in format, typography and illustrations, also issued under his direction in 1835, would be at home in any of the later volumes. The Report of the Council for the year 1836, read at the anniversary meeting on April 29, 1837, records his death and contains a eulogy of his services, the justice of which a study of the records fully confirms. It recites his magnificent gifts to the library, states that the "present state of the Finances, of the Gardens, of the Museum, and of the Publications testified to the zeal, the diligence, the industrious and ever-watchful care" bestowed by him upon "whatever related to the prosperity or credit of the Society." In cold fact, the first "peak" in the number of Fellows, and of visitors, and income was reached in 1836, the year of his death.

Bennett was succeeded by William Yarrell (1836–38), zoologist and publisher. Yarrell had been one of the original members of the Society, and without doubt had served it well. But his private affairs seem to have left him little time to give to the Society, and when he

resigned, a downward drop in the numbers, income and public interest had set in, to be continued under his successors, the Rev. John Barlow, F.R.S. (1838–40), and William Ogilby (1840–47). I have been unable to ascertain the reasons for the election of Barlow as Secretary ; the Minutes show little trace of his activities, and he published nothing in the Scientific Proceedings or Transactions. He resigned on account of ill-health and frequent absence from London, and the Council's expression of regret was polite. Ogilby, of Trinity College, Cambridge, was a mathematician and an accomplished zoologist, and there is a long list of his communications to the Scientific Meetings, chiefly technical descriptions of mammals. But under his regime the Society reached its most depressed period, and when he resigned, early in 1847, on the ground that his Irish estates required attention, the Council decided that a change had to be made in the conduct of the affairs. He lived until 1873 in Dublin and in 1872 published a quarto volume (Longmans) on the Configuration of the Earth. The Secretaries after Bennett apparently had regarded their office chiefly as a position of scientific dignity, and had left the practical management to a paid assistant, who, however diligent, had little authority or power of initiative. The first Assistant Secretary had got into difficulties over his accounts, chiefly from the casual habit of giving no receipts for the subscriptions of Fellows. The second, Rees, who held the post until 1845, and the last, C. S. Bompas, appear in the records as harassed but praiseworthy clerks. It was decided to abolish the post of Assistant Secretary and to make the Secretary a paid officer who should devote his time to the affairs of the Society. Ogilby's resignation was placed in the hands of the Council in January, 1847, and at a special meeting early in February, Mr. James Wishaw, a Member of Council, resigned, making the vacancy required by the Charter. On the motion of Mr. Yarrell, seconded by Mr. Ogilby, David William Mitchell was appointed to the Council

and to the Secretaryship, at a salary at the rate of £250 per annum until the next annual meeting when, in conformity with the Charter, the appointment was confirmed by the Fellows. No reasons are recorded in the Council Minutes or in the Annual Reports for the choice of Mitchell, but he was clearly suitable. He was an Oxford graduate, a Fellow of the Linnean Society, and a zoological artist. At the time of his appointment he was engaged in drawing the very beautiful plates illustrating G. R. Gray's folio, "The Genera of Birds." He remained Secretary until the anniversary in 1859, when he retired to take up the appointment of Director of the newly-founded Jardin d'Acclimatation, in Paris. He died in Paris in November of the same year, under circumstances described at the time as "very painful and melancholy." There is no doubt as to the value of his services to the Society. The Scientific Meetings and Publications were kept at a high standard and the number of Fellows greatly increased. The improvements at the Gardens were notable, and the number of visitors and the revenue grew. He persuaded the Council to change the rule by which the public required a Fellow's order as well as payment to gain admission. He aroused the interest of the Press in particular animals and events at the Gardens, and laid the foundations of a period of prosperity. The Council voted him a grant of £500 on his retirement. When his successor in the secretaryship reported his death to the Council, he stated that there were sums of money due from him to the Society. A Committee of two Members of Council and the Secretary reported in detail, and it was resolved to instruct solicitors to proceed against the executors of the estate. One at least of the items was found to be erroneous, and as there is no further mention of the legal proceedings in the Minutes or the accounts, it may be inferred that the whole matter was dropped.

Mitchell's successor, Philip Lutley Sclater (1859–1902), had already been a Member of Council for two

years and was proposed for the secretaryship by Professor Owen, seconded by Dr. Percy and recommended unanimously to the Anniversary Meeting of April 29, when he was duly elected. Sclater was a graduate of Oxford, a barrister and an ardent ornithologist and traveller. During his long tenure of the secretaryship he worked constantly at ornithology, and was the author of almost innumerable papers and memoirs, chiefly descriptive, on birds and on mammals. He was one of the founders of knowledge of the geographical distribution of animals, and he was the untiring friend of explorers, travellers and collectors. Under his rule, the scientific publications of the Society were kept to a high standard, and the library greatly enriched. With respect to the Gardens he was rather more interested in animals that were new to the collection or new to science than in the details of their health and housing. The geographical separation between the Society's offices, which were in Hanover Square, and the Gardens at Regent's Park, deprived the latter of the closer supervision which would have been to their benefit. Fortunately, however, during the greater part of his tenure of office, Sclater had the advantage of Bartlett as superintendent.

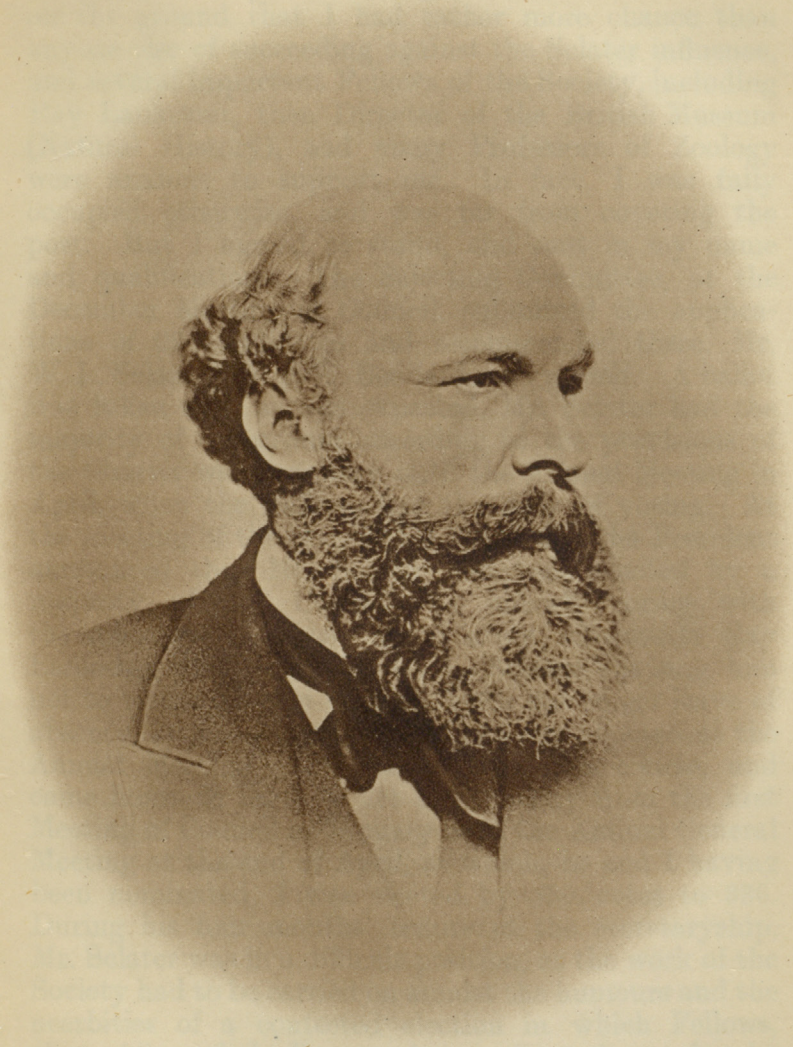
That remarkable man, Abraham Dee Bartlett, who for many decades personified the "Zoo" to the general public, was originally a taxidermist and a dealer in birds and mammals on a small scale, but was known as something more than the common type of small dealer. In 1839 he had read a paper on the species of Geese at one of the Scientific Meetings of the Society; in 1845 he had gained several prizes at the first poultry show held in the Gardens; in 1847 he read another communication to a Scientific Meeting, describing a new species of Coot. In 1851 he was appointed resident Superintendent at the Gardens, a post that he held until his death in 1897, in his eighty-fifth year. Bartlett had a large practical knowledge of living animals which grew greater year by year, and

although his conceptions of hygiene were not modern, he knew the habits of individuals and of species, and the beginning of his wisdom was to make animals comfortable, according to their conception of comfort, rather than ours. A phrase of his to me when, long before I had any official connection with the Society and was dissecting in the *post mortem* room, was that a particular animal had " been offended " by the keeper and would never thrive in his charge. He believed in the individuality of animals, watched them, and was devoted to them. He was a frequent contributor to the Scientific Proceedings of the Society and was the mainstay of the Gardens over a very long period. In his old age he was, naturally, less capable, and the power fell into the hands of his son, Clarence, who had been appointed Assistant Superintendent and Clerk of the Works in 1872. Clarence was a different type, of lower ability and character, a sycophant with his superiors and a bully with his inferiors. Unfortunately, the Council and the Secretary retained the habit of leaving too much in the hands of the Gardens' officials, even after old Bartlett had ceased to be effective, and the Purchase of Animals and Garden Committees were summoned to meet only at increasingly long intervals. Matters became rapidly worse when, on the death of Bartlett, his son was appointed his successor and was allowed to nominate his own Clerk of the Works. Much of the disrepute into which the Gardens undoubtedly began to fall about the end of last century arose from this cause.

Just criticism of the state of the Gardens and of some minor matters in the administration of the Society were mingled with personal attacks on Dr. Sclater, which those who were acquainted with his work and personal character resented. Extremely uncomfortable and confused feelings were aroused amongst the Fellows and in the Council. At the October Meeting of Council in 1902, the Secretary stated his wish to retire at the end of that year. His resignation was accepted, and a

Special Meeting was called to consider the position. The President, being unable to attend, requested that no resolution should be passed until a subsequent meeting at which he would be able to take the Chair. At that meeting, held on November 10, a vote of thanks was passed to the retiring Secretary for his valuable services during a period of over forty-three years, recording that during that period the income of the Society and the number of Fellows had doubled, and stating that the high position in the world of science occupied by the Zoological Society was largely due to his exertions and personal character. It was further agreed to pay to him a pension at the rate of £700 per annum.

On the motion of the President a Committee of Council, consisting of himself, Sir Joseph Fayrer, Dr. Günther, Professor Howes, Mr. Howard Saunders, Dr. Woodward, Mr. de Winton, Mr. Druce, Lt.-Col. Irby, Sir Harry Johnston, Dr. Chalmers Mitchell and Mr. O. Thomas was appointed to consider the general position of the Society's affairs. It was further agreed that a new Secretary should be advertised for, evidence of acquaintance with zoology and administrative ability being required. The President, Dr. Günther, Professor Howes and Dr. Woodward were appointed a Selecting Committee to receive applications and present a short list to Council. A difficult position arose for me personally. It was well known that Dr. Sclater hoped to be succeeded by his son, Mr. W. L. Sclater, like myself an Oxford graduate with honours in zoology, and then director of the Museum at Cape Town, and that probably a majority of Members of Council were so tied to Dr. Sclater by long personal friendship that opposition to his wishes was unlikely. Moreover, under ordinary circumstances, W. L. Sclater would have been a most eligible candidate. But it seemed clearer as the enquiry into the administration of the Society's affairs proceeded that radical changes would have to be made and that these would be most difficult for the son of



From a Portrait in the Ornithological Works

VISCOUNT WALDEN, F.R.S.
(NINTH MARQUIS OF TWEEDDALE)
President, 1868–1879

the late Secretary. I was urged to become a candidate on the ground that I had rather more chance than anyone else of succeeding against the Sclater influence, and several important Fellows of the Society, including Ray Lankester, then Director of the British Museum (Natural History), and many Professors of Zoology were anxious to support me. In fact, I was fully occupied otherwise, and was far from coveting the post. But I agreed to stand, and sent in my name and qualifications. The Selecting Committee, at the December Meeting of Council, submitted the applications of 22 candidates and recommended three, Mr. W. L. Sclater, Mr. F. E. Beddard, and myself. A ballot was taken and, as was expected, Mr. Sclater had the majority of votes, and according to the provisions of the Charter was Secretary until the Annual Meeting in April, when the Fellows had the duty of voting. At the meeting of the Society held next day the President announced that Mr. Sclater had been elected by a majority of the Council, he himself voting with the minority. Almost immediately afterwards Ray Lankester cabled to Mr. W. L. Sclater advising him not to resign his post at Cape Town but to get leave of absence, as his election was going to be opposed at the Annual Meeting. Mr. Sclater took this course, and came home on leave to act as Secretary from the first Meeting of Council in January until the Annual General Meeting at the end of April, at which, he and I having been nominated, I was elected by 530 votes to 336. During his four months' tenure of the secretaryship, Mr. Sclater was in a difficult position, as the work of the Society had to be carried on amidst the humours and the acerbities of a contested election in which Fellows, the public and the Press took an animated part, but he carried out his duties with extreme courtesy. It is pleasant to recall that Dr. Sclater, his son and I, retained our personal friendship through it all, and one of my first duties as the new Secretary was to assist in repelling the attack on the pension which had been granted

to Mr. Sclater and was submitted for confirmation by the Fellows.

The Committee of Enquiry into the Society's affairs had completed its labours by the end of 1902. Their Report, after having been considered by the Council, was read, by the direction of the President, to the General Meeting of the Society on January 22, 1903, and the President himself read the Resolutions which had been passed on the findings. These were then printed and circulated to all the Fellows.

They were drastic. They covered almost every branch of the Society's affairs, from finance to the care of the animals. They abolished such perquisites as the profits on the Garden Guide being the property of the Secretary, and the receipts from the lavatories going to the Superintendent. They forbade members of the staff dealing in animals, and laid down a large series of reforms in housing. The Superintendent was retired on pension, and Mr. W. E. de Winton, a Member of the Council, was appointed to act as Superintendent for one year whilst the new Secretary and the Garden Committee were carrying out the reforms. The Garden Committee was strengthened, a House and Library Committee was appointed, and a Special Committee was formed to enquire and report on the best methods of carrying out *post-mortem* examinations as a guide to treatment of sickness and prevention of disease as well as anatomical research. The mode of disbursements by the Secretary was placed on a more regular footing. Professional Auditors were engaged to examine the accounts periodically, as well as to assist the Annual Committee of Auditors. The existing Finance Committee was replaced by one consisting of representatives of the spending Committees. The granting of honorary and free admission tickets was revised. The Record Committee was requested to consider methods of reducing the burden on the funds of the Society caused by its low sales and large costs.

The Lecture Committee was abolished, and the income arising from the Davis Bequest was assigned to the Zoological Record.

As I had been a member of the Committee which had suggested these changes, it was comparatively easy for me to carry them out and work with them when on April 30, 1903, I began my duties. The Committee system worked admirably and has continued on the original lines ever since, with the addition that the temporary Committee, appointed to consider the work in the Prosectorium, was replaced by a permanent Prosectorial Committee which, in addition to Members of Council, contained Fellows of the Society with special knowledge of anatomical, physiological and pathological work. When the Committees had real work to do and met regularly, the Members took a deep interest in all the matters that came before them, and there has always been keen competition for membership of them. The Garden Committee took its functions with extreme seriousness, and made regular inspection of the houses and animals an important part of their duties. Since the offices were moved to the Gardens, all the Members of Council have been brought in close contact with the Gardens, and a visit of inspection by the Council as a whole precedes every Meeting.

In November, 1903, Mr. de Winton, who had taken the post of Acting Superintendent only temporarily, informed the Council of his wish to resign at the end of the year. In accepting his resignation, the Council passed a warm and well-deserved vote of thanks. The Gardens were in an even more dilapidated condition and the staff more out of hand than the Committee of Enquiry had had time to discover. De Winton was so tireless in his watchfulness over keepers, helpers, gardeners and members of the Works' staff that he was called " De Wet " by the men, a nickname of contemporary significance. He did great service in his short period of office.

Advertisements were issued for a resident Superintendent. He was to be responsible to the Secretary but with the right of appeal to the Chairman of the Garden Committee, a right which has never been exercised. He was to be in immediate control of the Menagerie through the Assistant Superintendent, of the Gardening Staff through the Head Gardener, of the Works Department through the Clerk of the Works, and of the Stores Department through the Store Keeper. Fortunately each of the subordinate posts was now filled by a thoroughly efficient and reliable man so that the new Superintendent had a great opportunity. Out of a very large number of candidates, five were selected by the Garden Committee, and the Council, after interviewing these, chose Mr. Reginald Innes Pocock, then on the staff of the British Museum of Natural History. Pocock was a distinguished systematic naturalist who had published important work chiefly on Arachnida, but had taken a wide interest in mammals and had been on collecting expeditions. He quickly gained and retained the personal regard and esteem of members of successive Councils and of his colleagues and subordinates on the Society's staff. He remained in office until March, 1923, when, on reaching his sixtieth year, he retired on pension. During his tenure he acquired a wide knowledge of the species and varieties of mammals, and by his researches, chiefly on their external characters and skulls, added to knowledge and to the scientific reputation of the Society.

From 1903 onwards, the work of improving the Gardens went on with increasing rapidity, and it soon became apparent that to achieve the best results some reorganisation would be necessary. In November, 1908, the President, at my request, got the Council to appoint a small Committee to enquire into the administration of the Gardens. The Committee interviewed all the officers and nearly all the keepers, and as the result of the enquiries presented a detailed report and

recommendations which Council adopted. The more important of the latter were that the management of the Menagerie, with its keepers and helpers, should be divided into two branches, one for mammals and one for birds, with a smaller third branch to be developed later for reptiles, batrachia, fishes and invertebrates, and that the branches should be under the control of respectively a Curator of Mammals and a Curator of Birds, the reptiles, etc., being for the present assigned to the Curator of Mammals. The Curators were to be independent of each other, as separate officers of the Society, directly responsible to the Secretary. It was further laid down that each Curator was to inspect all the animals and houses in his department daily, and subordinate any research work he might be doing to the care of the living animals. Mr. Pocock was appointed Curator of Mammals, but retained his duties as Superintendent of the Gardens except so far as he was relieved of these by the appointment of a Curator of Birds and Inspector of Works.

Mr. David Seth-Smith was appointed Curator of Birds and Inspector of Works. Seth-Smith was a Fellow of the Society and ex-Member of Council who had been trained as an architect but who had devoted himself specially to ornithology. He was the author of the standard monograph on Parrakeets and was well known as an aviculturist and as a successful amateur breeder of small birds. Since his appointment, the collection of Birds has been much improved, and our successes in breeding have been remarkable in view of the fact that the conditions in Gardens, often crowded with visitors, are far from ideal for breeding. Seth-Smith has contributed many valuable notes to the Society's Scientific Proceedings, and his skill as a photographer has enabled him to put on permanent record the phenomena of display in many birds.

When the two Curators were appointed a number of other changes were made. Arthur Thomson, the

Assistant Superintendent, was retired on pension, but was granted an additional retaining fee to have a first call on his services in case they should be required for the transport of animals from abroad. Thomson came to the Gardens as a helper in 1869, became a full keeper in 1871, served as clerk in the Bartletts' office from 1873 to 1889, when he became head keeper, until his appointment as Assistant Superintendent in 1899. He had acquired a large knowledge of animals and was very skilful in handling and moving them. He was an honest servant, often under unnecessary temptations, and was a personal favourite with many distinguished visitors and Fellows. Unfortunately he suffered from a nervous complaint, which rendered him increasingly liable to outbreaks of temper, and he did not get on too well either with the Superintendent or with his subordinates. He was replaced by Edward Ockenden, a most competent man in every way, of whom more will be said in relation to the Prosectorium. It was intended that his duties should be chiefly out-of-doors, in relation to order and discipline in the Gardens, sanitation in the houses and superintendence of the welfare of the animals. Mr. Pocock, however, took full advantage of Ockenden's skill as a clerk, and the arrangement did not work exactly in the way that had been designed.

The classification of keepers was altered so as to secure greater responsibility. A limited number of head keepers were selected and given immediate authority over sections of the Collection with respect both to the animals and the keepers. The scale of wages was raised and the arrangements for leave were improved. I may say here, that since then there have been further changes in the same direction, so as to secure the sense of individual responsibility, improve the conditions of service and increase the difference in pay between the grades, from overseers, as the highest rank is now termed, down to the boys starting on probation as helpers. The keepers, helpers, works' staff and gardeners have been formed into a Zoological

Gardens Society, with a committee of their own, managing sports and other social functions, and in direct touch with me when they wish to make any representations as to any of their affairs. Frequently I consult them when questions of discipline arise, and find that on the whole they are disposed to take a sterner view of misconduct than always seems necessary. A pension scheme has been arranged under which, subject to good conduct, all the men on the staff are pensionable, and sick pay and sick leave have been put on a secure basis.

Early in 1911 I was able to circulate a memorandum to Council suggesting that the time had come when it was possible to relieve Mr. Pocock still further by the appointment of the third Curator contemplated in 1908. Accordingly, Edward George Boulenger was appointed Curator of Reptiles, Amphibia and Fish on a year's probation, which was soon transformed into a permanent post, subject only, as in the case of the others, to formal annual re-appointment. Boulenger was the son of Dr. G. A. Boulenger, a former Member of Council and the greatest living authority on the cold-blooded vertebrates. He had acquired a considerable knowledge of the creatures with which he was to be charged from his father, he had had a business training in the City, and spoke French and German fluently—a most useful qualification as the Society has many relations with the Continent. Boulenger at once took hold of his work, transformed the Reptile House, did what was possible with the old Fish House, and helped in the general work of the Gardens, relieving the other Curators when they were absent on leave. As will be related presently, he took a large part in the development of the plans for the new aquarium, superintended its construction and equipment and when it was opened was appointed its Director.

In 1913 Professor Maxwell Lefroy, formerly State Entomologist in India and then Professor of Entomo-

logy at the Imperial College of Science, was appointed Honorary Curator of the new Insect House. He undertook to give it general superintendence by frequent visits, and was allowed to bring his students to study there. Lefroy was a man of amazing knowledge of entomology, especially on its economic side, but he was of a restless and versatile disposition, devoting himself with an almost dæmonic zeal to one practical application of entomology after another. He died in October, 1925, in actual fact, accidentally poisoned in the course of experiments he was carrying out on an insecticide. During the War, when house flies became a menace, Lefroy and I arranged an exhibition of the known methods of destroying them, and Lefroy gave a series of demonstrations and lectures which were attended largely by Sanitary Inspectors and Army Officers. He was given leave of absence for the greater part of 1916 to go to India on a Government mission, and still later, to visit the United States and Australia for the purpose of devising methods of cleaning from beetle, huge stores of Government grain which were being destroyed. In May, 1917, Miss Lucy Evelyn Cheesman, a former pupil of his, was appointed Assistant Curator on his recommendation, and diligently carried on the work during his many absences. In January, 1920, under pressure of other work, Lefroy resigned his Curatorship, but undertook, without accepting responsibility, to watch over the interests of the House and to attend the Garden Committee for that purpose. Miss Cheesman was appointed Curator and carried out the duties of the post until September, 1923, when she was given leave of absence to go on a collecting expedition round the world. Mr. L. C. Bushby was appointed Acting Curator for the year during which Miss Cheesman expected to be away. Miss Cheesman returned to England in October, 1925, and was offered re-appointment, but declined as she was not prepared to accept some of the conditions laid down. Mr. Bushby, who had managed the Insect House with great success, was appointed Curator in

Wm. Lawrence

SIR W. H. FLOWER, K.C.B., F.R.S.
President, 1879–1899

December, 1925, and still holds the post to the advantage of the Society.

When I knew that Mr. Pocock was about to resign, I was extremely anxious that a successor should be found with qualifications that would ensure a close attention to general sanitation, and with the habit of managing men. Fortunately I was able to recommend Dr. Geoffrey Marr Vevers, and the Garden Committee and Council, after examination of his qualifications and a personal interview, appointed him Superintendent of the Gardens from March 15, 1923. At the same time some reorganisation of the posts was necessary, and the new Superintendent with, as formerly, direct responsibility to the Secretary, was made the superior officer of the Curators and Prosectorial staff, and in direct control of the works, stores, gatekeepers and gardening department. As a part of the re-arrangement, Mr. Seth-Smith was made Resident Curator of Mammals and Birds. Vevers had high qualifications in addition to an agreeable personality. He was a qualified medical man, and as Captain in the R.A.M.C. from 1916 to 1919, he had learned to command men and to attend to sanitation. At the time of his appointment he was Beit Memorial Research Fellow and Assistant Helminthologist at the London School of Tropical Medicine. For a time he had served as Honorary Parasitologist to the Gardens, and had written a number of memoirs on human and animal parasites. He had travelled in the tropics and brought back gifts of animals for the Society. The rapid improvement in the smartness and general appearance of the Gardens since his appointment is largely due to his watchful activity, and he has been untiring in his care of the health of the animals and of the men.

The last appointment to be mentioned has also been of great advantage to the Society. Soon after the Aquarium was opened and Mr. Boulenger was appointed Director, it became clear that the charge of a large and

highly technical department would leave him insufficient time for the minute care required by the collection of reptiles and amphibians. Fortunately, the services of Miss Joan Beauchamp Procter were available. She had been trained under Boulenger's father and was a personal friend of the son. Miss Procter was already known to the Council as she had been at work for months in the Gardens, designing and modelling the rockwork in the aquarium, and she was appointed Curator of Reptiles and Amphibians for one year from November, 1923, to work under Mr. Boulenger's general supervision. After the year of probation, Miss Procter was appointed as full Curator, she and Mr. Boulenger continuing to understudy one another and taking charge of both Aquarium and Reptile House during the absence of either of them. Miss Procter had kept living reptiles and amphibians since she was a small child and was an expert in their care and handling. For several years she had worked under Dr. Boulenger at the British Museum (Natural History), and, after his retirement, had been in full charge of the Department for several years. She was the author of many scientific memoirs and was well known to experts in the group throughout the world, with the result that through her correspondents she had been able to extend the collection. But in addition to such scientific knowledge of the group, she is devoted to them as living creatures, studies their distastes and tastes in health and in disease, and has added much to knowledge of their treatment in captivity. Miss Procter has proved to possess unusual gifts as a practical and decorative designer, and in addition to her work on the new Reptile House to which I shall refer later, she has designed and superintended the construction of most of the new rockwork and outdoor enclosures in the Gardens.

I have described the growth in the organisation of the Gardens in some detail, because, although some of my scientific friends have been disposed at times to insist on the dignity of " science " as compared with

the mere exhibition of living animals, I believe that the study of living animals is the specific object of a Zoological Society. We can know little of animals unless we study them as living things, and at present such study can be carried out most easily in menageries. But there is also the practical reason; the Zoological Gardens provide nearly the whole of the income which supports the Zoological Society either directly from visitors who pay at the gates, or from Fellows who subscribe in order to gain admission. We could not support our Library or our Scientific Publications or aid anatomical or systematic zoology as we do, but for the revenue derived from the Gardens.

Chapter IV.

PROGRESS THROUGH THE CENTURY.

In the Chart (Frontispiece) I have plotted out three curves showing the vicissitudes and growth of the Society through its century of existence. The horizontal scale is marked with the years from 1829 to 1928. The vertical scale represents units respectively of 50 Fellows, £1,000 of income, and 15,000 visitors, these numbers having been selected so as to bring the three factors or indications of the states of prosperity of the Society into the same picture. Somewhere vertically above each year there are placed three signs, a circle with a central dot for the number of Fellows, a solid circle for the number of visitors and a plain circle for the income of the year in question. The figure on the vertical scale opposite each sign represents the number of Fellows when multiplied by fifty, the income in thousands of pounds and the number of visitors to the Gardens when multiplied by 15,000. As is usual in graphic charts, the signs of each series are connected with lines to guide the eye. The curves thus formed show the history of the Society and it will be seen at once that there is a general but not a close correspondence between the three factors represented.

Just as a temperature chart shows the history of a disease with its crises, recoveries and relapses, so these curves display changes in the prosperity of the Society with the difference that the peaks, instead of indicating fever, reveal prosperity. The curve representing the number of Fellows is naturally the smoothest of the three, showing less violent fluctuations. Fellows are elected to the Society, pay their admission fees and their annual subscriptions and do not suddenly increase in numbers because the weather is fine or because there is a special attraction in London or in the Gardens.

On the other hand, their numbers do indicate in a broad way the changes in the reputation of the Society as a whole. The first few years showed a very rapid increase in the numbers due to enthusiasm for a Society of a new kind, and partly, I believe, due to the fact that in the early days even those members of the public who were ready to pay for admission to the Gardens or to the Museum had to be provided with a Fellow's order. The numbers reached a high peak under Bennett and Yarrell, and were not surpassed until forty years later in the middle of Dr. Sclater's management. They dropped rapidly under Barlow and Ogilby, in whose time little was done to enhance either the popular or the scientific reputation of the Society. Under Mitchell, they showed a little improvement, but when Dr. Sclater took office they rapidly increased, reaching a second high peak about the middle of his career. They then dropped slowly but steadily until about 1894 they began to move upwards. Some of this rise, however, was not real, for in 1903 it was found that the lists had not been purged for some years and contained many names of whom nothing had been heard for years and some of whom, chiefly life compounders and dormant members, were discovered to have been dead for many years. From the early years of the present century the numbers rose rapidly and continuously until the years of the War. That they did not show a great drop during that calamitous time is due partly to the increased strength of the Society in every respect, and partly because the Council decided not to press for the annual subscriptions of those away on active service. As soon as the War was over the numbers resumed their upward course, which they have continued until it has become a serious question whether in view of the limited capacity of the Gardens a limitation in the total number of Fellows might not be expedient.

The curve which shows the most violent and the most interesting fluctuations is that representing the

numbers of visitors. Its changes reflect the condition of the Gardens, special events or attractions in them, with the consequent publicity given them in the Press, the weather, and circumstances such as the Great Exhibition which brought additional visitors to London and secondarily to the Gardens. If the general course of the curve be followed, neglecting the more violent fluctuations for the moment, it will be seen that when the initial interest caused by the opening of a new resort in London had passed away, there was a slight recovery and then a rapid fall until 1846, when the Council became seriously alarmed, and, on the resignation of Ogilby, appointed a Secretary of a different type. D. W. Mitchell at once devised special measures to improve the popularity of the Gardens, persuading the Council to allow visitors to enter simply on payment without the production of a voucher from a Fellow, thus at once turning them from a private and privileged preserve to a great popular institution. At the same time he improved the conditions of the Gardens themselves, and by arranging exhibits of special interest, obtained the co-operation of the Press. Again neglecting the larger fluctuations, it will be seen that the curve rose steadily until between 1870 and 1900 when it kept between 600,000 and 700,000 visitors. After a slight drop, it began to climb again until the years of the War were reached. It fell sharply in 1914 and rose slightly in 1915 and 1916, dropped heavily during the depressing months of 1917 and 1918, after which it resumed its general upward trend more rapidly than before. That it did not fall more heavily during the War is due to several causes. The War brought a great and floating population to London, and many of these found time to pay a hurried visit to the Gardens. Although at the first Council Meeting in August, 1914, there were some Members who, on the plea " business as usual," urged that no changes should be made and that the reserves which had been accumulated should be employed now that the rainy day had come, wiser

counsel prevailed. Expenditure was cut down to the minimum necessary for maintenance; no new animals were bought and those that could easily be replaced and were costly to maintain were gradually used as food. Officers and men in uniform or in hospital uniform, together with ladies and children whom they brought, were admitted to the Gardens on Sundays without tickets, and on weekdays at sixpence each. The price of admission of the general public was also reduced to sixpence on Saturdays, and these measures, whatever effect they might have had on the finances of the Society, increased the numbers of visitors and the esteem in which the Society was held.

Let me now turn to some of the high peaks. The first was a jump in 1851, the year of the Great Exhibition, when London was thronged with a great crowd of British and foreign visitors. This was also the year in which A. D. Bartlett became Superintendent, at the suggestion of Mitchell, the Secretary, who had known him for many years. The next peak was in 1862, the year of the International Exhibition, which had a slightly greater effect on the number of visitors than its predecessor. The next high peak was 1876, when the number of visitors exceeded 900,000, a "record" not surpassed until 1912. It was due to the exhibition of a collection of animals from India, made during the visit of the Prince of Wales (afterwards King Edward) to that country. There had been two earlier special collections from India. In 1864, Thomson, the head-keeper, who had been sent to Calcutta for the purpose, brought back a pair of Indian rhinoceroses and many interesting birds collected and presented by Corresponding Members, including the Rajah Rajendra Mullick, there having been very few deaths on the journey. In 1868, Clarence Bartlett brought back another collection, presented by the same group of persons, but there were heavy losses on the journey and the arrivals contained little of interest. Neither of these events has left a mark on the visitors' curve. It

was very different with the 1876 collection. The visit to India of the Heir to the Throne had been an event of national importance, and when it was known that the collection made by him was to be exhibited at the Zoo, the Press, and especially the *Illustrated London News*, devoted much space to the subject. The animals, which included four elephants, two tigers, bears, monkeys, antelopes, sheep and goats, and many birds, were exhibited during the summer in a tent, and were visited by Queen Victoria, the Prince and Princess of Wales and other members of the Royal Family. Later in the year some of the animals were sent to Dublin, at the request of their owner, but one of the elephants lived in the Gardens until 1896.

The next peak (1882) was due to a different kind of event, chronicled in the Council's annual report for the following year rather briefly :—

"The sale of the large male African elephant, 'Jumbo,' was an event connected with the menagerie in 1882, which, as it excited great public attention to the Society's affairs, and had, consequently, a very beneficial effect on the Garden receipts, cannot pass unalluded to in the present Report.

"It was not surprising to the Council that so general a regret should have been expressed by visitors to the Gardens and the public generally at the prospect of losing the great African elephant. No one shared in this regret more than the Members of Council, and they would not have consented to part with the animal unless satisfactory reasons for so doing had been placed before them by the responsible executive of the Gardens."

The price received for the elephant (£2,000), and the additional gate money arising from public interest in the matter, made it possible for the Council to order the construction of the Reptile House, which they had long hoped to build. So much has been written about "Jumbo" that I shall set down only the more important facts. "Jumbo," the first African elephant to

Elliott & Fry

ELEVENTH DUKE OF BEDFORD, K.G., F.R.S.
President from 1899

be owned by the Society, was obtained by exchange from the Jardin des Plantes, in Paris, on June 26, 1865, being then a young animal. A few months later, a female African elephant, afterwards known as "Alice," was purchased from a dealer for £500; she had been obtained in the Sudan by the Italian traveller, Casanova (not the writer of the Memoirs), and had come to London through Vienna. On the arrival of Alice, she was about 3 ft. 6 in. in height and 6 ft. 3 in. in girth, the corresponding measurements for "Jumbo" on the same day being 5 ft. 6 in. and 9 ft. 6 in. "Jumbo" grew into a magnificent animal and was a great favourite with the public, but, as is not infrequent, or, perhaps, even usual, with male elephants, either African or Indian, when he was adult he showed periodic outbreaks of violent and dangerous temper. In December, 1881, Bartlett reported to the Council on the danger that arose from time to time. The elephant in these fits did much damage to his enclosure and undoubtedly would have killed anyone who entered it, probably even the keeper, Matthew Scott. Bartlett asked leave to be supplied with a rifle capable of killing "Jumbo," in case, as he feared, an emergency might arise. Before this had been decided, the offer arrived from Barnum, the famous American entrepreneur. It is not known how Barnum came to know that the animal might be bought, but it is easy to understand that the Council, at that time anxious for money and presented with the alternative of a lucrative sale or having to sanction the possible destruction of the animal, accepted the offer. Nor is it known precisely how the excitement about the sale arose, but there is more than a suspicion that Barnum, a prince of advertisers, had some hand in it. An agitation was started amongst the Fellows which led to an action testing the powers of the Council, eventually decided in favour of the Council. The Press fomented the excitement, certainly in complete good faith, and the myth arose that "Alice" was the "wife" of Jumbo (although the two had never been together) and that

the separation of the two was a piece of heartless cruelty. The difficulties of transporting an elephant which cannot be led on foot without danger, are great, and the Council, anticipating these, had given careful instructions as to the construction of the travelling case, and as Barnum's agents had accepted the responsibility of taking over the elephant as it stood in its compartment in the Gardens, had laid down special conditions as to the methods to be used, insisting on the presence of a representative of the Society for the Prevention of Cruelty to Animals. The difficulties proved at least as great as had been anticipated and led to fantastic tales of the mental grief of "Jumbo" and of his about-to-be bereaved "wife." In due course, however, "Jumbo" was shipped and reached the United States.

It is easy to be wise after the event, but probably the Council, although acting in complete good faith, were unwise in selling so magnificent an animal. There was no reason why keepers should have entered its cage whilst it was in one of his dangerous moods, and the strengthening of the bars was not a difficult bit of constructional work.

There was not another peak until 1906, when the attendance beat every record back to 1876. This, also, was due to a Royal gift. King George, then the Prince of Wales, in the course of his visit to India (1905–6) had arranged to visit the native State of Nepal. The Government of Nepal and H.H. Maharajah Sir Chandra Shum Shere Jung had made a representative collection of the fauna of Nepal for presentation to the Prince, and His Royal Highness, following the generous example of King Edward, offered it to the Society. The President, the Duke of Bedford, in accepting the offer on behalf of the Society, most generously agreed to be at the personal cost of bringing the collection home. An outbreak of cholera in Nepal had prevented the Prince from actually visiting the State, and the delay caused by this and the

great heat in Calcutta, where the collection had to wait shipment for some time, postponed the arrival of the animals in England until June. They included three tigers, a rhinoceros and an elephant, bears, leopards, many deer and antelopes and a fine collection of birds. It seemed important to exhibit the animals as a separate collection during the summer. I had ascertained some time previously that the public canal footbridge, just beyond the boundary of the Gardens, was about to be rebuilt and I was able to arrange with the First Commissioner of Works, then Mr. L. Harcourt, that the Society should pay the cost of doubling it, the bridge to be divided along the middle with the outer half for the public, the inner half within the grounds of the Society. This made it possible to use a large strip of waste land at the west end of the North Garden, on which the Indian Collection was housed. After it was dispersed to suitable permanent quarters, the Society had gained a useful addition to its area. As an experiment, and to allow as many visitors as possible to see the Prince's Collection, the price of admission to the Gardens on Saturdays in August was reduced to sixpence, and as a partial compensation to Fellows, a band was provided on Thursdays during that month. Notwithstanding much advertising, no great advantage was taken of the reduced rate, and the Council did not renew the experiment.

The next peak year was 1912, when for the first time in the history of the Society the number of visitors reached and exceeded a million. The success was again due to a Royal Collection. On his State Visit to India in 1911, the King had been able to visit Nepal, and an even finer collection of animals was presented to him than that of 1906. On His Majesty offering them to the Society, the President again undertook to defray the cost of the transport home. At the same time the Government of the Federated Malay States had made a special collection for presentation to the Society. To provide for the exhibition of the two collections, a portion

of ground now occupied by the Mappin Terraces was cleared and laid out. The King and Queen paid a private visit to inspect the two collections.

The following year, 1913, was even a greater success. Public attention had been redirected to the Gardens, which were in better order in every way, and it seemed as if the Society was moving towards permanently increasing prosperity. Then came the War, but immediately after that, in 1919, the curve of visitors took a great leap upwards, and the upward course, with minor fluctuations, has continued since, 1928 being the highest point in the history of the Society. The Exhibition at Wembley in 1924 certainly helped, because of the visitors it brought to London, but it seems fair to attribute the rising curve to the improvements in the attractions, notably the Aquarium in 1924, the Reptile House in 1927, and the Bird House in 1928.

It will be noticed that the third curve, representing the income of the Society in units of £1,000, follows the curve of visitors very closely and in itself requires no special comment. The rapid rise from about the beginning of this century onwards represents increase of income from several sources. The income from Fellows' subscriptions, which was, in round figures,£6,600 in 1902, reached nearly £21,000 in 1928. The income from admissions to the Gardens was under £17,000 in 1902, and was well over £71,000 in 1928. The income from dividends and interest was £71 in 1902, and over £1,500 in 1928. In 1902 the Society received only £1,019 from the Refreshment Department; in 1928 it received £19,800. Items from which there was no return in 1902 appear in the income of 1928, such as admissions to the Aquarium, £17,800; sale of Garden Guides and Postcards, nearly £5,000; Lavatory receipts nearly £1,000.

An object of the Society, laid down in the Charter, was the "introduction of new and curious subjects of the Animal Kingdom." In the minds of those who

composed the draft, the possibility of adding to the species of animals domesticated by man for his pleasure or profit certainly was prominent. It is odd to reflect how the origin of the familiar domesticated animals lies in dim antiquity. I doubt if any mammal has been domesticated in the full sense within historical times. A few birds have been domesticated from a wild stock, in the true sense of breeding in captivity without necessary renewal from wild nature, within the last few centuries, the American turkey and the Australian budgerigar or grass parrakeet being familiar instances. Many plants, notably rubber, coffee and cocoa, are recent acquisitions and even these have still to struggle against diseases which they have met under the new conditions. A century ago there were high hopes of finding, in the wide areas of the world that were then relatively or absolutely unknown, animals which might thrive in England to our advantage.

The beginning of domestication is breeding in captivity, and the small area in Regent's Park allotted to the Society was suited neither in area nor in soil for experiments in breeding. In the Report of Council, read to the Meeting in 1829, the disadvantages of Regent's Park for breeding and domestication were described, and there was set forth the consequent "necessity of forming an establishment at such a distance from London as should ensure sufficient quiet, and at the same time should be easily accessible." In consequence, they had negotiated with a Mr. Pallmer and the Corporation of Kingston, for the "occupation of a farm, consisting of a house with some convenient buildings, and about thirty-three acres of land nine miles from Hyde Park Corner, in a beautiful situation under the wall of Richmond Park, with a light soil peculiarly favourable for rearing birds, full of very abundant springs, and with some excellent ponds." Seven and a half acres of the farm were bought freehold, and the remainder was taken for twenty-one years, renewable at the end of ten years, but it was provided

that the lease might be given up at twelve months' notice. It was proposed that the farm should be accessible to Fellows and their friends under the same regulations as governed admission to the Museum and Menagerie. The application of the Farm to the objects of the Society was detailed as follows :—

"1. In affording a convenient relief and assistance to the Menagerie in the Park by removing from it such quadrupeds and birds as may require a quiet place to bring forth and rear their young ; also, in receiving the duplicates of the collection which it may be expedient to keep in hand to replace those which are exhibited in the Park, when necessary ; and likewise to maintain such as want a more extended range than the Garden at present admits of, or which it is necessary to allow to remain at liberty.

"2. The rearing various domesticated quadrupeds and birds, both of ornamental as well as useful varieties, with a view of having their kinds true and free from mixture ; or in effecting improvements in the quality or properties of those which are used for the table ; and likewise in domesticating subjects from our own or foreign countries, which have not hitherto been inmates of our poultry or farm yards.

"3. The conducting of experiments in all matters relating to breeding and points of animal physiology connected therewith, the range of which is very various and extensive. Many of these will require much time to be completed ; some may be brought to a conclusion within a year or two. It is remarkable that there never have been published any correctly recorded facts on which the opinions at present entertained by physiologists on many of such matters can be supported. It is to be hoped that the Zoological Society may be the instrument of settling many questions of this description in a satisfactory manner."

These were high objects and raised questions to most of which the answers have not yet been found. I

conceive them to have been due to Sabine, who of all the men, except Davy, associated with the foundation of the Society, had the most questing scientific mind and the widest knowledge as to the direction in which it was most necessary to pursue research. But the enterprise was completely unsuccessful. Why it is not easy to guess now, but it is clear that the Society was undertaking a burden for which it had not sufficient funds, and the records are at least open to the interpretation that Sabine and the Farm were opposed on the one hand by those who attached most importance to the collections in the Museum, and on the other, by those who wished to be amused and interested by walking in a well-laid-out garden to look at strange or beautiful wild animals. He was attacked bitterly, both inside the Society and publicly, and his resignation from the treasurership seems to have been due partly to resentment at these criticisms.

A Mr. Crofts was appointed manager, and for some time Sabine had rooms at the Farm, furnished at his own expense. In the Council Report for 1830, a paragraph was introduced giving an abbreviated account of the objects of the Farm, and it was suggested, somewhat sanguinely, that " even in the present year " specimens might be offered to Fellows of the Society of many of the " rarer kinds of pigeons and rabbits, of domestic fowls, of variegated silver and Chinese pheasants," and of some of the " more remarkable kinds of water fowl." It was added that kangaroos, emus and black swans might be bred, and the importation of " capercaily, Norway grouse and bustards " was contemplated. The Farm had cost £2,378 during the year, and clearly to meet criticism, the Council stated that in future its expenditure was to be limited to £1,000 annually, exclusive of money gained from sales of produce or stock. The Report for 1831, however, showed an expenditure of £1,426 and receipts only of £58, much additional expense having been incurred to provide for the housing of the King's collection from Windsor, which included

Wapiti, Sambur and Axis deer, common and Burchell's zebra, kangaroos, emus and Cereopsis geese. In 1831 there was controversy amongst the Fellows about the Farm, it having cost £1,861 against receipts of £88. A Committee appointed to report on it issued rather an unsatisfactory account, their final paragraph especially recommending a " patient perseverance in one uniform system," being convinced that " unsteadiness of purpose and frequent change of plan " were the " certain means of preventing success." Following that report, the Council asked the Committee, conjointly with Yarrell, to continue their superintendence of the establishment and by every means in their power to reduce the expense. During 1832 much of the stock was sold by auction, the staff was reduced and notice was given to terminate the lease in 1834. In 1834, the remainder of the stock was sold, the lease given up and the small portion of freehold put on the market. The experiment had come to an end.

Another department of the Society's activities which also did not long survive, although its career and its ending were more fortunate, must now be considered. This was the Museum.

In the early part of last century the Natural History section of the British Museum, then still at Bloomsbury, was in an unsatisfactory condition, partly from lack of accommodation and partly from the insufficiency of the scientific staff. Persons who had made collections in distant countries at great trouble and had brought them home at great expense, naturally desired to have them examined, named, and preserved. Many of the original founders of the Society were people of that type and others were competent naturalists who wished the material. The first prospectus included in the objects of the proposed Society the formation of a " general collection in Zoology " and the provision of a Museum in the metropolis. Mr. Bicheno, addressing the Zoological Club of the Linnean Society in November,

From a Painting lent by Chas. Drummond, Esq.

CHARLES DRUMMOND
Treasurer 1831–1858

1826, said that the new Zoological Society "meditated the establishment of a Museum," which had already been enriched by the private collection of Mr. Vigors and the Sumatran Collection of the late Sir Stamford Raffles, and that every exertion was to be made to form an osteological collection. Mr. Children, a year later, referred to new species and genera of which the types were amongst Raffles' Collection. In November, 1829, Mr. Joshua Brookes spoke of the "extraordinary and wonderful progress of the Museum" and of its having been enriched by donations from His Majesty, the Hudson's Bay Co., Sir Benjamin D'Urban, Dr. Richardson, Captain Lyon, Captain Beechey, Captain Franklin, Captain Friend and numerous travellers and others. According to him, it then contained about six hundred specimens of mammalia, four thousand birds, one thousand reptiles and fishes, one thousand testacea and crustacea, and thirty thousand insects. Eleven thousand visitors had inspected the collection in the course of the year.

Vigors, from his special tastes, naturally paid most attention to the Museum, leaving the Gardens and the Farm to Sabine, and rapid progress was made. In 1828, over £300 was spent on cases and preserving materials; £236 was received for the admission of visitors, and a catalogue had been prepared and was on sale. In the previous year, moreover, there began the very important connection of John Gould with the Society as he was appointed Curator and Preserver. Gould, one of the most illustrious of British naturalists, was born at Lyme Regis, in Dorsetshire, in 1804, the son of a gardener, who in 1818 received an appointment in the Royal gardens at Windsor. There, and afterwards in Yorkshire, young Gould was trained as a horticulturist, but devoted much time to the observation of birds, and became a skilled taxidermist, which led to his appointment in the Museum of the Zoological Society. He married in 1829, the lady being an accomplished artist who, in fact, drew on stone

very many of the illustrations of his works. He began his great career at once, and by 1832 had published the first of his magnificent series of folios, under the title, "A Century of Birds from the Himalaya Mountains," Vigors doing most of the description and Gould, aided by his wife, the illustrations. He remained in the service of the Society until 1837, during which period he not only got the Museum in order and catalogued it, but produced his "Birds of Europe," in five folio volumes, a "Monograph of the Toucans," and two parts of another on the Trogons. He then resigned his post to go to Australia to collect the necessary materials for his work on the "Birds of Australia," which he had just begun. He was made a Corresponding Member of the Society, and soon after his return, in 1840, became a full Fellow, in later years serving repeatedly on the Council. He died in 1881, and if the Zoological Society had no other claims, its existence would be justified from the fact that it gave Gould his opportunity. G. R. Waterhouse, afterwards an assistant in the British Museum and the father of F. H. Waterhouse, for many years the Society's Librarian, succeeded Gould as Curator of the Museum in 1836, and was succeeded by Louis Fraser until 1845, from which date until its being given up the Museum was in charge of two subordinates, little more than caretakers.

In 1829 over £200 was spent on museum cabinets, and £562 was received from visitors and the sale of catalogues. The years 1830, 1831 and 1832 showed figures of the same order, and the Council's Reports referred repeatedly to the great increase in the collection and the need of a suitable building. In 1833 a long series of gifts was chronicled, coming from New York, Nepal, Madeira, Mauritius and Madagascar, India, New Zealand, the West Indies and Nubia. The Council had instructed Decimus Burton to prepare a plan and a model of a suitable building to be erected in Central London and then referred the question to a Committee, at first of six, and subsequently of the whole Council,

which discussed alternative proposals early in 1834. In favour of housing the Collection in the Gardens, it was urged that a site would not have to be bought, that the building might be added to gradually without borrowing, that the air would be purer, that living and dead specimens might be compared, that the Museum and the Gardens, by each attracting visitors, would assist one another. Against it was urged the dampness, the inconvenience for holding the evening scientific meetings there, and the necessity of having an additional building in London for offices. The conclusion was that the interests of the Society were "less likely to be advanced by building in the immediate neighbourhood of the Gardens, than by acquiring a Museum in a more central part of London." The division of opinion reflects the contrast between those Fellows who regarded the Zoological Society in the first place as an institution for the reading, discussion and publication of scientific papers and the advancement of systematic zoology, with the Gardens as a subsidiary, although possibly a money-earning, appanage, and those who took a wider view. In 1842, when the same question came up again, the division of opinion was crudely but exactly expressed in a quotation from the *Literary Gazette*, quoted by Scherren.

"The resolution to preserve the Museum, and with it the scientific, *versus* the mere wild-beast show part of the Society, has been fully confirmed, and a design by Mr. Elmslie provisionally adopted for the building."

The division of opinion reappeared much later when the transference of the Offices from Hanover Square to the Gardens was opposed, and, still more recently, in discussions at the Annual Meetings over the Zoological Record it has appeared that some Fellows and even prominent zoologists still believe that systematic zoology is more entitled to the description "scientific" than is the study of living animals.

In 1834, however, Vigors and his supporters triumphed, and at a Special General Meeting of the Society it was decided to acquire and equip a building in Central London for Offices and Museum. A donation fund was opened for the purpose. In 1835, accordingly, premises in Leicester Square, originally the house of John Hunter, were taken at an annual rent of £400, and fittings to the amount of £1,200 were ordered. The Report for 1836 states that the expenditure on the Museum was £3,050 and the receipts £38, but that there had been a remarkable series of gifts of specimens and that the specimens exhibited consisted of 870 mammals, 4,800 birds (of which 2,000 were labelled), 450 reptiles, and 600 fishes. The Report for 1837 again records additions to the collection, and refers to the publication of a catalogue of the Mammalia containing the English and scientific name of each species, the country which it inhabited, the name of the donor, and references to works in which the names of new species had been described. On the other hand, the expenditure on the Museum was £1,875, and the receipts only £59. The Reports for 1838 and 1839 showed similar results—growth of the collections, high expenditure and minute receipts. The Council began to be perturbed, and although insisting that the maintenance of what they called the scientific side was "essential to the dignity and respectability of the Society," admitted that "Although the collections remained in the present confined and inconvenient premises, any extraordinary outlay would be inexpedient, at least, if not an act of very questionable utility." In the Report for 1841, it was stated that the Museum question was in an unsettled position and that a Committee was about to report to the whole Society on it. They had the collection valued by J. O. Westwood, the entomologist, and John Gould, who put the value at £10,965, of which the insects accounted for £1,000. But as the premises in Leicester Square were in a dangerous condition, partly because of the demolition of adjoining houses,

they had given up the lease and had stored the collection temporarily in Dufour's Place, Golden Square. The Committee reported to a Special General Meeting of the Society held in Willis's Rooms on May 20, 1841, at which it was decided to retain the Museum as an integral part of the scientific establishment, and a Committee was appointed to discuss ways and means. The Committee in its turn reported to another General Meeting of the Society in July, when it was agreed to build a museum if a site could be obtained on lease, and to draw on the investment fund to the amount of £5,000. Plans were advertised for and nine sets were submitted for competition, " all of them respectable, and some of very considerable merit." The plan submitted by Mr. Elmslie was selected, as, " combined with a chaste architectural elevation," it " afforded the greatest accommodation and required the least immediate outlay." But the income had been falling and the Society was in low water. Mr. Elmslie had to be disappointed, and according to the Report for 1842, the Council decided that at a cost of about £1,600 they could complete the new Carnivora Terrace at the Gardens and convert the old Carnivora House into a Museum. The move was made in the following year, and the Museum was opened to visitors to the Gardens without further payment. The Reports for several years following make little reference to the Museum, which appears to have ceased to attract important donations. In 1848 duplicates were given to the museums of Norwich, Ipswich, Dover, Worcester, Lancaster and Warrington, the Council stating that, " without impoverishing the Museum of the Society by a single species, they were thus promoting the rising taste for zoology in the provinces."

In the meantime, the National Collections, although still in Bloomsbury and not yet removed to the great building in South Kensington, had been recovering from their abandoned state. In their Report read at the Annual Meeting in 1850, the Council stated that

"they regard with pleasure the progress which has been recently made in the National and provincial collections, and which, presenting so striking a contrast with their condition at the time when the Zoological Society was founded, renders the maintenance of our own Museum as a separate collection no longer an object of the importance which it formerly possessed."

In the following year they announced that animals which had died in the Gardens were now being presented to the British Museum, the Royal College of Surgeons and various provincial museums. That practice, instituted in 1850, has been continued ever since, and very many valuable additions to these institutions have been made by the Society.

In 1851 Gould lent to the Society his wonderful collection of mounted humming birds, and these were exhibited in a special building erected near the Lion House. It attracted over 75,000 visitors, and, without doubt, added to the popularity of the Gardens in the year of the Great Exhibition. It was lent also in 1852, and then returned to the owner. In 1852, also, a further change was made in the Museum. The Council noted the great extension of the galleries for the exhibition of species in the British Museum and decided that in the limited space at the Gardens only genera should be illustrated.

In the Report for 1855, read at the Annual Meeting in April, 1856, the end of the Museum is described as follows:—

"Having been long impressed with the conviction that the remarkable development of the Natural History Department in the British Museum has for some years past entirely superseded the necessity of maintaining a second Zoological Museum in London, the Council has latterly reduced the expenditure on the Society's Museum to its conservation only, without any additions being made to the imperfect series of species contained in it.

"Taking these circumstances into consideration, together with the entire inadequacy of the building at the Gardens for a general collection, as well as the entire inexpediency of incurring any further expenditure for an object which is so effectually carried out in the National Collection, the Council determined during the year which has passed to dispose of a portion of the contents of the Museum as favourable opportunities occur of obtaining a fair value for the specimens.

"The National Collection having the strongest claim, in every respect, to the assistance which the Society's Collection was capable of affording towards its completion, the Council felt that the first step to be taken was to transfer to the Trustees of the British Museum the whole of the types of species described in the Society's publications, in order that they may be there preserved during the longest possible period for the purpose of reference and identification.

"The Trustees having accepted the collection of types on this understanding, the Council trust that they have carried out in the most effective manner the intentions of the Collectors and Donors of these interesting and important objects.

"Having thus provided for the safety of these historic types, the Council entered into a negotiation with the Trustees of the British Museum for the transfer of such other portions of the collection by sale as were desirable for the purpose of filling up desiderata in the National Museum. The series so selected by the Keeper of the Zoological Department was accepted by the Trustees at an agreed price of £500.

"The Council have effected sales to the Boards of Direction in Her Majesty's colleges at Galway and Cork to the extent of £700, in addition to the sum received from the Trustees of the British Museum; besides smaller sales to several provincial and other museums, by which they consider the study of zoological science will be beneficially extended.

"In thus disposing of the Society's Collection, the Council have not lost sight of its scientific utility; and they believe that in the plan which they have adopted the objects of which it is composed will be made much more generally available for the advancement of science than if they had been retained in the Society's establishment."

It is interesting to notice that the Prince Consort arranged for a special meeting of the Council at which he could preside when the form in which this momentous decision was to be announced was decided. William Yarrell and Sir Benjamin Brodie were at the Council Meeting when the details were arranged. Next year (1857), when the arrangements were carried out and the Museum was closed, Professor Owen, by that time Superintendent of the Natural History Department of the British Museum, and John Gould were on the Council, and the latter made an offer, which was accepted, to buy the birds' skins not otherwise disposed of for the sum of £40.

The wisdom of the decision cannot be doubted. Even in 1836 there were divided counsels amongst the zoologists who attended the scientific meetings of the Society, and Charles Darwin, just returned from his voyage on the "Beagle," and considering what to do with his vast collection of specimens, decided against giving them to the Museum of the Zoological Society. In a letter written to Henslow (Life and Letters, 1887, vol. i, p. 273), he said: "The Zoological Museum is nearly full, and upwards of a thousand specimens remain unmounted. I daresay the British Museum would receive them, but I cannot feel, from all I hear, any great respect even for the present state of that establishment." In the same letter (*loc. cit.*, p. 274), he added: "I am out of patience with the zoologists, not because they are overworked, but for their mean, quarrelsome spirit. I went the other evening to the Zoological Society, where the speakers were snarling

From a Photograph lent by Chas. Drummond, Esq.

ROBERT DRUMMOND
Treasurer, 1858–1881

at each other in a manner anything but like that of gentlemen." I have had the curiosity to consult the reports of the Meetings held about the time to which Darwin refers. There is no record of those present unless they took an actual part in the proceedings. But on December 27, when Professor Owen was in the Chair, there was a discussion on hybridism, a subject which without doubt would have attracted Darwin. It arose from two birds presented to the Society and alleged to be the progeny of a barn-door fowl and a cock pheasant. Instances were also brought forward of what were stated to be three-quarter bred pheasants and therefore showed the possible fertility of hybrids. Yarrell admitted that the infertility of hybrids was the rule, but claimed that exceptions had been proved. Vigors, even in the trimmed report, seems to have insisted on the infertility with acerbity and the Chairman leaned to the same view, but suggested that experiments should be undertaken. So far as I can judge from the printed reports, the proceedings at other meetings at about that date seem to have been decorously dull.

The Council were no more than just when they referred to the part of the collection given to the British Museum as "historic types." When a new species is named, as a rule only characters sufficient to distinguish it from other known species of the same genus are described. As knowledge grows and other allied forms are discovered, it is often difficult to ascertain from the older descriptions precisely what animal was meant. To make the denotation of zoological names precise, modern workers try to associate the conception of types with that of names. In the case of sub-species or species the "type" is a single specimen, either the only one which the author had before him when he was writing his description or one definitely selected by him. The "type" is registered and ought to be kept in a large museum where it is accessible to future workers. A very large number of the specimens

in the Museum of the Zoological Society were the bases of new species and their value to modern workers is immense. Unfortunately, exact particulars of the specimens were not always kept, or, if they were kept, have not been preserved. In the library to-day there is a copy of a Catalogue of Mammals and Birds in the Museum, dated April, 1829, probably the work chiefly of Vigors, and an enlarged edition with a number of woodcuts, and one Reptile, dated September of the same year. We have also a copy of the second edition of a Catalogue of the Mammalia preserved in the Museum, dated 1838. On the title page the author is given as G. R. Waterhouse, Curator, but the name is ruled out.

My friend, Mr. Norman B. Kinnear, of the Zoological Department, British Museum, has sent me notes on the collections formerly in the Zoological Museum, gradually got together by those engaged on the types at South Kensington. He quotes Mr. O. Thomas, the expert on Mammals, to the effect that the Zoological Society's specimens, obtained by the Natural History Department in 1852, were the " most important historical collection ever received at the Museum." It contained many specimens described by B. H. Hodgson, from Nepal; John Gould, from Australia; Sir John Richardson, from Canada; Dr. Bachman, from the United States of America; Sir Andrew Smith, from Cape Colony, and many others.

The specimens obtained during Sir John Franklin's expedition to the Arctic were given to the Society's Museum by the Government in 1831, and in the same year the specimens obtained by Captain P. P. King when in command of the surveying voyage of H.M.S. " Adventure " and " Beagle " in the Straits of Magellan, were distributed between the British Museum, the Zoological Society and the Museum of the University of Edinburgh. The Society's Museum was even richer in birds from most parts of the world, and there were large collections of reptiles, fishes, insects and other invertebrates.

Chapter V.

THE LIBRARY AND SCIENTIFIC PUBLICATIONS.

In an ambiguous phrase in the resolution of Council thanking Dr. P. L. Sclater for his services to the Society, it is said that during his tenure of the secretaryship the "Society's Library had been entirely created." The statement is inexact, unless it refers merely to the rooms at Hanover Square which were handsomely fitted as a Library in 1883. In the Report of the Council for the year 1836, under the heading "Library," the following occurs :—

"The formation of a collection of books, embracing works on Zoology and of general interest, has always been considered by the Council as one of the objects contemplated by the founders of the Society; the delay which has taken place hitherto in effecting this object has arisen from the desire of the Council to devote, in the first instance, the resources of the Society towards the acquisition of a Vivarium and Museum. These objects having been attained, it is intended in future to devote annually to the purchase of books, such sums as may be conveniently spared from the general receipts.

"The Council take this opportunity of directing the special attention of the Society to the valuable and important addition which has been made to this department in the course of the last two years by the late Secretary, their lamented colleague, Edward Turner Bennett, Esq."

The Report went on to day that the collection presented by Bennett and "selected by him with that excellent judgment for which he was ever distinguished" consisted of two hundred and eighteen volumes. It

cited some of these, such as Cuvier's "Les Ossemens Fossiles," Everard Home's "Lectures on Comparative Anatomy," Linnæus' "Systema Naturæ," and works by Edwards, Latham, Lamarck, Richardson and Swainson, Brisson, Buffon, Le Vaillant, Vieillot, and various British and foreign scientific periodicals. In the Report for 1837, it was stated that £100 had been voted for library purchases during the year, that a donation of twenty-five guineas had been made by Charles Morris for the same purpose, that a Book of Recommendations had been placed in the Meeting Room for the suggestions of Fellows, and a list of additions was given, including such classical works as the Fishes of Cuvier and Valenciennes, Walckener's "Aranoides," Temminck's "Mammalogie," Wagler's "Amphibien," Schoenherr's "Synonymia," and many others. In 1838, the Proceedings of Academies and Scientific Institutions in various parts of the world began to be taken in, partly by purchase, partly in exchange for the Society's own publications. In 1839 a first list of exchanges with other Institutions was printed in the Report and a long list of other additions to the Library was given. These Lists of Additions to the Library were ever afterwards regular features of the Annual Report. In the Report for 1851, the Council added, no doubt at the suggestion of D. W. Mitchell, the Secretary, that they had begun to get made by J. Wolf a series of drawings of living animals for addition to the Library. During the year a drawing of jaguars, made by Mr. Wolf and exhibited by the Secretary, was ordered to be presented to Lord Harris. This is the first record that I have found of the Society's connection with Josef Wolf, the famous animal painter. He was a German who had been apprenticed to a lithographer at Coblenz, and had studied at Antwerp Academy. He came to London in 1848, illustrated Robert Gray's "Genera of Birds," and assisted Gould in "Birds of Great Britain." It was not until 1861, however, that he began the series of "Zoological Sketches" for the Society, or the later "Life and Habits of Wild

Animals." The originals of these famous water-colour drawings were exhibited from 1866 in a room in the Gardens over the Old Lecture Room, on the site where the offices now stand. Unfortunately they were allowed to fade considerably at the Gardens and, later on, when taken to the Offices in Hanover Square. In 1910, I had them replaced by reproductions which are now in the Council Room of the Society, and had them re-mounted and preserved in a folio in the Library. The Report for 1852, besides the usual list of additions to the Library, gives a list of 28 drawings made by Wolf and placed in a portfolio. The Reports for the following years continue the list of additions to the Library by purchase, presentation, and exchange for the Society's own publications. In 1854, 16 more of Wolf's drawings were added and in that year, also, a first edition of a catalogue of the Library was published. The Report for 1859, the year in which Dr. Sclater became Secretary, gives a list of 82 drawings by Wolf, then in the Library, and states that the valuable scientific library had been re-arranged so as to make it more accessible, and that a complete catalogue which had been begun some time before would soon be completed. This was not issued, but a supplement to the original edition appeared in 1864, the two together containing 1,550 titles. The Library grew year by year, and in 1867 a third clerk was added to the office, with special charge of the Library. This was R. Bowdler Sharpe, the genial and well-known ornithologist (1847–1909). He had entered the publishing house of W. H. Smith & Son in 1863, and afterwards was a year with Bernard Quaritch, the famous bookseller. Sharpe had been interested in birds as a boy, and in the Library of the Society, specially rich in ornithological works, he developed his tastes to such an extent that by 1871 he had begun to publish some of the results of his work. In 1872 he left the service of the Society to become Senior Assistant in the Department of Zoology at the British Museum, and

soon became widely known as one of the leaders of ornithology. With his help and with the active interest of Sclater, the Library continued to grow, and in 1872 a second edition of the Catalogue was published. In 1872 Mr. Frederick H. Waterhouse (1845–1919) was appointed Librarian. He was a son of Waterhouse, the well-known naturalist, and served the Society until 1913, when he retired on pension, attending to the Library and assisting the Secretary in his private zoological work. Waterhouse prepared a third edition of the Catalogue in 1880, with a supplement issued in 1883, a fourth edition (1887), and a fifth published in 1902. The steady growth of the Library is shown by the number of entries in the successive issues of the Catalogue. The first edition and supplement together contained 1,550 titles, the second (1872) 2,100, the third and supplement 4,200, the fourth (1887) about 6,560, and the fifth (1902) 11,000 exclusive of the periodicals, the total number of volumes being estimated at 25,500. In 1910, when the books were removed from Hanover Square and rearranged in the new offices and library at the Gardens, we estimated the total number of volumes at well over 40,000. It was thought that provision had been made for the growth of many years, but in 1921, chiefly on account of the growth of the series of periodicals and the addition of new periodicals, another extensive rearrangement had to be made. An extensive book store fitted with modern metal cases was made, and in the Library proper only the annual volumes for the last ten years of periodicals were kept, the earlier volumes being removed to the store from which they could be brought up as they were required. Each year, when a new bound volume is added to the set of ten upstairs, the oldest of the ten is taken down to the store, so that the series on the public shelves continue to occupy approximately the same space and the same relative positions. The total number of volumes of books and periodicals in the Library now exceeds 60,000.

It is almost impossible to estimate the money value of the collection as it is to-day. There can be few more important zoological libraries in the world, and none richer in illustrated monographs which cannot be bought.

During Sclater's time of office, although there was a book kept for suggestions, the duty of selecting additions fell largely into his own hands. In the re-organisation which took place in 1903, a House and Library Committee was appointed which meets regularly and discusses all matters connected with the Library, including the purchase of additions.

On the death of Waterhouse, Henry Peavot (1881–1917), who had been assistant to the Librarian and Clerk of Publications since 1908, after having served first as a junior clerk (1896) and then as assistant to the accountant, was appointed Librarian and Clerk of Publications. He joined the Army in 1916 and was killed at the front in France by a shell, in April, 1917, to the very deep regret of the staff at the office and of the many Fellows whom he had assisted in the Library. During Peavot's absence and after his death until the end of 1918, the work was carried on with efficiency by Mrs. Peavot, his wife, who had been my secretary and was well acquainted with the routine duties. In January, 1919, Frederick Martin Duncan was appointed Clerk of Publications and Librarian, a post he still holds. Martin Duncan was the son of Professor P. Martin Duncan, F.R.S., geologist and naturalist, and had done research in marine biology and agricultural entomology. As an expert photographer he had been one of the pioneers in applying the cinematograph to the movements of invertebrate and microscopic animals. His expert knowledge of photographic processes has been of benefit to the Society in connection with lantern arrangements for the scientific meetings and in the preparation of figures and process blocks for the *Proceedings* and *Transactions*. At my suggestion he has

made a number of cinematographic records of rare animals whilst they were alive in the Gardens, and duplicates of these are preserved in the Library. As Librarian, besides assisting Fellows who read or borrow books, and superintending the Library generally, with the aid of his assistant he has prepared a geographical card catalogue and has got a long way in the preparation of a new catalogue.

I have already referred to what may be called the first scientific meeting of the Society, which took place on April 25, 1827 (*see* p. 35). In 1829, when the Zoological Club of the Linnean Society—the organ of zoologists at the time—came to an end, something new was required and the Zoological Society provided it. At the Council Meeting of July, 1830, a Committee of Science and Correspondence was appointed. Each Member of the Council was an *ex officio* member, and many prominent Fellows received invitations. The Committee was charged with the duties of suggesting and discussing questions and experiments in animal physiology, of exchanging communications with the Corresponding Members of the Society, of promoting the importation of rare and useful animals, and of receiving and preparing reports on matters connected with zoology.

The Council further ordered that the Committee should be requested to meet at the Society's Rooms, at eight o'clock on Tuesday, the 9th of November, and on every subsequent second and fourth Tuesday of the month. This order was the starting point of the Society's regular Scientific Meetings which have taken place, except for a short interval when an experiment was tried, on Tuesdays fortnightly with a break in the summer months. In the early sixties, the meetings were not well attended, and the Council thought of amalgamating them with those of other Societies. From November, 1866, to June, 1867, by the courtesy of the Linnean Society, the Scientific Meetings of the

From a Photograph lent by Chas. Drummond, Esq.

CHARLES DRUMMOND
Treasurer from 1881

Zoological Society were held in the rooms of the Linnean on Thursdays, alternate with the meetings of that Society. The intention was that members of both institutions should attend both sets of meetings. The experiment did not succeed, and the Zoological Society reverted to its Tuesday meetings in its own House. Later on after the offices had been moved to the Gardens, 5.30 p.m. instead of 8 was made the time of meeting, as that hour was found more convenient for the majority of those who attended regularly. About the same time, partly to assist in the more regular appearance of the published *Proceedings*, and partly to avoid the two winter months, it was arranged that there should be an autumn session of three meetings, one in October and two in November, a spring session of six meetings, two respectively in February, March and April, and a summer session with two meetings in May and one in June.

At the first meeting, on November 9, 1829, the Chairman, R. W. Hay, a Member of Council, a geographer who had written on New Zealand and on the Gambia, and a Fellow of the Royal Society, explained the purpose of the meetings and urged Fellows of the Society to contribute to them. Vigors then described what was known of the quail-like birds of the New World, showed figures and skins of the known species of *Ortyx* and named and gave a diagnosis of two others which were new to science. Owen (afterwards Sir Richard) read the first part of a paper on "The Anatomy of the Orang Utan." The subject was a young male, which had been presented to the Society by Mr. Swinton, of Calcutta, but had reached this country in a debilitated state and had lived only a few days in Bruton Street. He compared its anatomy with that of man and the chimpanzee. There is no record of any discussion, and it has not been the regular habit of the Zoological Society, unlike that of many other Societies, to publish what was said in discussion as opposed to papers formally presented.

The first scientific meeting set a precedent which has been followed ever since. There were exhibitions of objects of zoological interest, and contributions to systematic zoology and to comparative anatomy. There are now more elaborate methods of display, such as the exhibition of lantern slides, of cinematograph films, and since the meetings have been held at the Gardens, it has been more possible to vary the proceedings by the introduction of living animals from the menagerie. Very many rare living birds, a young pygmy hippopotamus, a young rhinoceros, a gigantic land tortoise and one of the "dragons" or Komodo lizards have been shown at meetings in recent times. And just as Vigors, one of the leading systematic zoologists of the time, and Owen, one of the rising young anatomists, spoke at the first meeting, so successive meetings have been addressed from time to time by almost every British zoologist of distinction, as well as by many foreign zoologists.

The reading of papers would be an ephemeral contribution to science unless there was the possibility of publishing them. This was speedily arranged, and in 1830 there was printed for the Society the first part of our long series of *Scientific Proceedings*. The printer was Richard Taylor, of Red Lion Court, Fleet Street, afterwards succeeded by Taylor and Francis, of the same address, who still do our scientific printing. The volume contains "An Alphabetical List of Contributors," with references to the several articles contributed by each. There is a complete index of the scientific names of the animals mentioned in the volume, with the names of species newly described distinguished by a different type. The chief defect, from the modern point of view, is that the communications are not given titles, a deficiency which makes reference to them more difficult. The title page is also different. The volume is described as *Proceedings of the Committee of Science* and *Correspondence of the Zoological Society of London*. But in

all essential respects, except size and the absence of illustrations, it is closely similar to the volumes of the current year.

The first volume covered the Meetings of 1830 and 1831. Volume II covered the Meetings for 1832, and in size and title was identical with Volume I, and was called Part II. The Council Report states that the scientific *Proceedings* for each month were published in the first week of the following month. I have not seen any of these separate copies, but only the bound and indexed volumes for the year.

Clearly, however, the Committee of Science and Correspondence was not wholly satisfactory, and as all the Members of Council were *ex officio* on that Committee and so had a preponderating voice, new regulations were discussed and incorporated in by-laws by which a Committee of Publications, elected annually by the Fellows separately from the Council, became responsible for the Scientific Meetings, which were now separated from the business meetings, and publications. The volume for 1833 appeared under the new title, *Proceedings of the Zoological Society of London*, Part I, but was otherwise identical with its predecessors. This title was retained up to and including the volume for 1860, which was Part XXVIII of the *Proceedings of the Zoological Society of London*. The volumes were slim, seldom reaching much over 200 pages for the year until 1848, the first full year of Mitchell's secretaryship. The phrase, " with illustrations," was then added, and there were a number of woodcuts in the text, four uncoloured plates and nineteen beautifully hand-coloured plates, eight of mammals, six of birds, and five of lower animals. The volumes also gradually increased in size until that for 1858, which contained just under 600 pages. Sclater made no changes in the volumes for 1859 and 1860, but the volume for 1861, although otherwise identical, had the title page, " *Proceedings of the Scientific Meetings of the Zoological Society of London*

for the year 1861." The annual volumes gradually increased in size, and, although they varied from year to year, over 1,000 pages became common. Beginning with 1901, accordingly, for convenience they were divided into two volumes for each year so that the title pages had the imprints 1901, Vol. I, and 1901, Vol. II, each with separate pagination. This, however, made the references inconvenient as the full citation had to be *P.Z.S.*, 1901, Vol. I, p. —, and confusion often followed from the volume number being missed from the reference. Accordingly, from 1906 onwards, I restored the continuous pagination for the year, so that whether the year's output were bound for convenience in one volume or in two, the complete reference was *P.Z.S.*, 1906, p. —.

I do not know at what period the issuing of the Proceedings after each Meeting was dropped. As, however, importance is attached by systematic zoologists to the exact date on which a paper is published, because the priority of a new name dates not from the reading of the paper but from the day of its publication with adequate description, from 1904 on the Society has issued an "Abstract of the Scientific Proceedings" on the Monday following each Tuesday's Scientific Meeting, and in this, if it be required, new names with their diagnoses can be printed. As a further bibliographic convenience there was adopted in 1904 the practice of printing on the cover of each Part of the *Proceedings* (the annual volume is published actually in four quarterly "Parts") the exact day on which the preceding Part appeared. The confusion between real dates and the often inexact dates on the publications therefore no longer exists in the case of our *Scientific Proceedings*.

With the current year (1929) a change has been made in the *format* of the *Scientific Proceedings*, the first in their history. To give space for larger illustrations and to bring the size of the *Proceedings* into

uniformity with that of the periodicals of many other learned societies, they are to appear in future in royal octavo.

Although the *Proceedings* for each year have had their separate indexes, as time went on the task of consulting such separate annual issues became formidable. At Sclater's suggestion it was decided to publish index volumes, each covering a series of years. In 1863, the first of these in date of publication, although not in the period it covered, was issued. It indexed the years 1848–60 inclusive, and contained an alphabetically arranged list of the names of contributors, with the titles of, and references to, the several articles contributed by each, a list of the illustrations and an index of species described and referred to. In 1866 a volume covering the earliest years from 1830 to 1847 inclusive, was issued, identical in form except that, as there had been no illustrations, there were no references to include under that heading. Since then the indexes have been issued at ten-yearly intervals, covering respectively 1861–70 and so on, with the exception that the last index of the present series will cover only the eight volumes 1921–28 inclusive and will be in the old octavo size in harmony with the volumes to which it relates. Somewhat unfortunately in the volumes issued in 1872, 1882, 1892 and 1902, the illustrations were not indexed. I added a separate index of these in the volume covering 1901–10, and in the volume covering 1911–20 added the further bibliographic convenience of distinguishing the names of newly described genera or species from those which were not new by a different type, as had been done in the annual volumes until 1861, when Sclater had dropped it.

In addition to the *Scientific Proceedings*, which appeared regularly, the Society at a very early date began to issue its sumptuous *Transactions* in royal quarto. These were issued in Parts at irregular intervals, as suitable memoirs deemed too important for the

Proceedings were presented, and as the Society had funds to meet the cost. From time to time, when a sufficiently large number of Parts had appeared, a volume was closed, and a title page, table of contents and index were printed for binding. The *Proceedings* were printed and circulated to Fellows free of charge until 1863, but the cost of illustrating them had thrown a heavy burden on the resources of the Society and it was agreed that in future the *Proceedings* should be supplied only to Fellows and Corresponding Members who subscribed a guinea annually in advance. The subscription price to Fellows has not been altered since, although the increased cost of the publications and the decreased value of money might have justified such a course. It was intended from the beginning, however, that Fellows should pay for the *Transactions* if they desired to have them. In the Annual Report of the Council, read in April, 1833, it was laid down that the *Transactions* were to consist of the more important papers read at the meetings (" accompanied, where necessary, by figures of the objects treated of ") and should be sold at such price as seemed adequate to the expense incurred in their preparation, but the cost to Members was not to exceed three-fourths of that charged to the public. Much later the *Transactions* were included in the subscription price for the *Proceedings*.

The first Part of the *Transactions* appeared early in 1833, and Volume I was concluded in 1835. It contained 43 memoirs and 59 full-size plates, many of them beautifully coloured by hand, the work being done so skilfully that those which have been well preserved show no signs of fading. Amongst the more famous papers and subjects were a description of *Cryptoproctus*, by E. T. Bennett, and of *Ornithorhynchus*, by George Bennett, a very large number of anatomical memoirs by Owen, including one on the osteology of the Chimpanzee and Orang Utan. Thomas Bell, the famous anatomist, wrote on the Three-toed Sloth ; Hope, the

founder of the Hope Collection and Professorship at Oxford, contributed a memoir on Beetles; Robert Grant wrote on several marine organisms, and Broderip and Yarrell on a number of subjects.

This high standard has been maintained, and, in all, the Society has issued twenty-one complete volumes and one part of another volume, forming a magnificent series of contributions to zoological knowledge.

From time to time the question has been raised by those who scrutinise the annual accounts as to the justification of so large an expenditure by the Society as these scientific publications have entailed, for at no time have the sales and subscriptions even approached the cost of production. The answer is double. On the strictly economic side it has to be pointed out that a very large part of the value of the Library comes from publications of other bodies received in exchange for those of this Society. The more general and efficient answer is that the foremost duty imposed on us by our Charter is the advancement of zoology and animal physiology. Not only are the authors of biological memoirs in this country not paid for their labours, but in many cases they have considerable difficulty in getting their work published, especially if it requires illustrations. The Royal Society administers a small annual Government grant in aid of publications, but even this is of relatively recent origin and the calls on it are heavy. The Zoological Society has been of great service to science in paying for publications and so relieving the claims on public funds.

The authors of memoirs both in the *Proceedings* and *Transactions* are granted a certain number of free separate copies of their papers for distribution amongst their correspondents and friends. Early in the century ingenious (and famous) authors invented a curious way of taking advantage of the Zoological and other Societies. They had their memoirs accepted for publication and when these had been printed and published at the

expense of the Society, they would take as many free copies as they could obtain, buy others at a nominal rate and then bind them up into monographs with a new title page, which they sold to their private advantage. As a consequence of this practice, the number of copies given was strictly limited and extra copies can be purchased only with the consent of the Publication Committee, the reason for the application having been approved.

Illustrations which have appeared in the Society's publications are frequently required for text-books or general books by the original authors or others. Sometimes permission was asked for such reproduction; sometimes it was assumed, a reference to the source being thought sufficient. Some years ago a curious position arose. A zoologist asked leave to reproduce some of the figures which had been published by the Society in a memoir of which he was the author. I found, on enquiry, that these figures had already been copied, without permission, elsewhere, and was advised that the copyright had passed into these other hands. In consequence a new arrangement was made by the Society; the author of every memoir we publish assigns his copyright to the Society, so that from that date onwards we are able to protect his interests.

Another valuable scientific publication with which the Society has long been connected, and which, soon after the War, was the subject of some animated differences of opinion, is the *Zoological Record*. Most zoological workers require knowledge of what other investigators in their own branch are doing. This knowledge, convenient for all, is indispensable for those engaged in the examination of museum collections and the description and naming of species.

In 1864 a group of English zoologists chiefly connected with the British Museum (Natural History) and the Zoological Society founded an annual series, to be known as *The Zoological Record*. The object was to

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F. W. Bond
Accountant from 1919

" give reports on, or abstracts of, and an index to, the various zoological publications which had appeared in the preceding year; to acquaint zoologists with the progress of every branch of their science in all parts of the globe; and to form a repertory which will retain its value for the student of future years." Dr. Günther, of the British Museum, was the leading spirit and first editor. The first volume, dealing with literature published in 1864, appeared in 1865. Since then, the annual series has been continued unbroken, so that the whole set of volumes forms an almost unique piece of scientific bibliography. But there were the usual financial difficulties in the case of a publication for which the costs must be great and the sales limited. The first five volumes were issued by Van Voorst, a London publisher interested in natural history, but the enterprise was unprofitable, and he abandoned it. Volumes 6 to 22 were issued by the Zoological Association, a private body of zoologists, aided by grants from the British Association, the Royal Society and the Zoological Society. In 1886 that Association, through failure of support, was unable to continue. The Zoological Society, largely through the influence of Sclater, Flower and Günther, unwilling that the publication should lapse, undertook the sole responsibility for issuing the annual volumes. Frank E. Beddard, then Prosector to the Society, became editor, a post that he held until the volume for 1891, when he was succeeded by David Sharp, the entomologist. Sharp was a bibliographer of the most patient and admirable type, and under his care the volumes increased year by year in their completeness and accuracy. But they remained a heavy burden on the resources of the Society, although neither editor nor recorders were paid in any reasonable proportion to the skilled work they did.

Soon after I became Secretary the position became grave. In 1900, the *International Catalogue of Scientific Literature* was founded, under the auspices of the Royal Society. One of the thirteen volumes of its

annual issues (N. Zoology) dealt with Zoology and professed to cover the same ground as the *Zoological Record*. The international system, from its complexity, had many disadvantages, and, in the opinion of zoologists generally, the volume dealing with their subject was much less useful than the corresponding volume of the *Record*, and certainly it was much later in appearing. But the *International Catalogue* had the formidable support of Governments, many of whom gave their subsidies in the form of subscribing for so many complete sets which they allotted to institutions in their countries. Many of our subscribers were cut off from us, and our sales were falling rapidly. Moreover, it was an obvious waste of effort for two organisations to be covering the same heavy ground. After very difficult and prolonged negotiations both with the International Catalogue Committee, on which I had a seat, and with the Zoological Record Committee, I contrived to get agreement to a compromise, under which the International Catalogue and the Zoological Society were to co-operate in the production of the annual volumes of zoological bibliography. Each volume was to be published with two title pages, one in series with the *International Catalogue*, the other with the *Zoological Record*. The Zoological Record Committee was to remain responsible for the scientific side of the production, that is to say, the compilation and editing, the International Catalogue was to undertake the printing and publishing and to supply raw material in the form of slips of titles sent in from the bureaus which had been established in various foreign countries. The Catalogue was to pay all the costs and to take all the receipts, but to pay an annual fee of £150 to the Society towards the cost of editing and compiling, the Society adding what it thought necessary to secure competent work. The arrangement was to be for five years, after which it could be reconsidered, and the Society had the power to resume its own publication if for any reason the *Catalogue* stopped.

The arrangement worked fairly smoothly and was continued at the end of the provisional five years for another period on similar terms. Then came the War, and the breakdown of international arrangements. The Royal Society had to announce that it could not be responsible for any volumes of the Catalogue subsequent to those relating to the literature of 1914. The Zoological Society was then able, in accordance with the terms of its agreement, to resume issuing the annual volumes of the *Zoological Record* as its own undertaking, but in view of the possibility of the Catalogue being resumed after the War it undertook to issue the volumes for 1915–20 at its sole financial risk, reserving a set in sheets to hand over to the Catalogue in case it should be required subsequently. Efforts to proceed with the *International Catalogue* having proved unsuccessful, the Zoological Society, with the formally expressed goodwill of the Royal Society, resolved to try to continue the *Record*.

As, however, the cost of the annual volumes had greatly increased with the general rise of prices after the War and as the annual sales were not satisfactory, the Society had to consider the position seriously. It was clear that the *Record* was of great service to workers in zoology, but especially to those engaged in museum work, and it seemed reasonable that those to whom it was of most service should contribute at least a share of the cost. Accordingly, other institutions were appealed to and a certain amount of support was received, but the Society has continued to pay by far the greatest part of the cost and to undertake the whole responsibility.

The *Index Zoologicus* is another bibliographical service rendered by the Society. In the year 1882, the Smithsonian Institution, of Washington, U.S.A., issued the *Nomenclator Zoologicus*, prepared by S. H. Scudder, intended to be a complete index to the generic names used in zoology to the close of the year 1879. Great labour was required for its compilation but the

work justified itself, as it was used by every one desiring to ascertain what names existed or of finding a clue to the origin and zoological use of some particular name. It was compiled from the previous "Nomenclators" of Agassiz and Marschall, together with the names contained in the index of the *Zoological Record*, with the addition of names supplied by other zoologists which had been omitted. It was expected that the Smithsonian Institution would continue to assist zoology by issuing further indexes at decennial intervals, but as this was not done and as the Secretary of the Smithsonian informed Dr. Sclater that it was not likely to be done, the Council of the Zoological Society, at Sclater's suggestion, sanctioned the preparation and issue of an index covering the years 1880–1900. It was compiled by Mr. Charles Owen Waterhouse, of the British Museum (Natural History), and contained the new names published in the volumes of the *Zoological Record*, names compiled from other sources by Mr. Waterhouse and other zoologists. It was issued in 1902, edited by Dr. David Sharp. Scudder's Index contained about 80,000 names; the *Index Zoologicus* added about 40,000, most of them new, some omissions from Scudder. In 1912, the *Index Zoologicus*, No. II, also compiled by Waterhouse and edited by Sharp, was published by the Zoological Society. It contained about 22,000 new names. Sharp, in his Preface, estimated that, allowing for mistakes and synonyms, about 140,000 names had been proposed for the genera and sub-genera of zoological taxonomy.

In the earlier years of the Society, lists of the animals exhibited in the Gardens were published frequently, sometimes in the annual reports, one of the most complete having been prepared by Broderip in 1844. In 1862 Dr. P. L. Sclater published the first full "List of the Vertebrated Animals now or lately living in the Gardens of the Zoological Society of London," giving the scientific name, the trivial or popular name, the habitat, and the date and mode of acquisition of each.

Further editions, with the additions of animals which had been received since, were published in 1863, 1865, 1867, 1872, 1877, 1879, 1880, 1883 and 1896. Much of the space in these volumes was occupied by lists of actual individuals, with the dates of their arrival, matters only of interest in exceptional cases. In the annual Report for each succeeding year there has been printed a list of the species new to the collection exhibited in the year to which the Report referred, and a manuscript catalogue has been kept up to date in the office. Since 1896, however, the cost of publishing another edition in the same form has been judged too great for the value of the volume. In connection with the Centenary, however, I obtained the sanction for the preparation and publication of a new vertebrate list on a larger scale. It contains, so far as it has been possible to ascertain them, the names of every vertebrate animal exhibited by the Society alive from 1826 to 1927. Without doubt this covers a large proportion of the species that are likely to be exhibited in captivity. With the object of making it of more than historical value, certain new features have been incorporated. For each species, the correct scientific name according to the accepted rules of nomenclature is given and to this are added the various synonyms or other scientific names that have been applied to it. Unfortunately, there is no absolute finality in these names, as a number of diligent persons think that they are adding to scientific knowledge by discovering in some hitherto overlooked memoir, a name which has priority, according to the rules, over that now in use. But their efforts tend now to be regarded with disfavour rather than approbation, and there is some hope that they may be arrested. Possibly the new vertebrate list may come to be accepted as final, at least for the animals mentioned in it. In addition to the scientific name, or names, popular, local, or trade, names are given, and a reference to the original scientific description and, where possible, to a figure and popular description.

It was necessary that these lists should be prepared by competent specialists, acquainted not only with the animals but with the methods and history of scientific nomenclature. I have been fortunate in obtaining the services of Fellows of the Society, well equipped for the purpose. Major Stanley Smyth Flower, formerly Director of the Zoological Gardens at Giza, Cairo, the son of a former President of the Society and himself a Vice-President, has prepared the List of Mammals and Reptiles; Dr. George Carmichael Low, one of the best-known amateur ornithologists in this country, that of Birds; Dr. Malcolm Arthur Smith, who during a long residence in the East has studied Amphibia in particular, and is now devoting himself entirely to work on that group, has prepared the Amphibia; and Mr. Edward George Boulenger, Director of our Aquarium, with the kind assistance of Mr. John Roxborough Norman, of the British Museum (Natural History), the Fishes.

The number of species of Mammals dealt with is 949; of Birds, 2,330; of Reptiles, 736; of Amphibians, 158; and of Fishes, 280. Partly for convenience and partly because of the amount of matter to be covered, the List is being published in three volumes—I, Mammals; II, Birds; and III, Reptiles, Amphibia and Fishes. They have been prepared on the same system, the details having been arranged by the experts in consultation, and we hope that they will be not merely a record of historical interest, but of real service to zoological gardens and those who are interested in living animals.

The earliest Guide to the Gardens was drawn up by Vigors and Broderip, and published early in 1829. I have seen only what is called the "Second Publication," dated July 18, 1829. It contains a Plan of the Gardens, but no other illustrations, a popular name, the scientific name and a short description of each animal. As an example, the following description

relates to what is now familiar as *Lycaon pictus*, the Cape hunting dog :—

" The Tortoise-shell Hyæna (a Female).

" Hyæna picta, *Temm.* Canis pictus, *Desm.*

" From the South of Africa.

" This animal is more frequently called the *Cape Dog*. Naturalists have differed in opinion whether it should be referred to the genus *Hycæna* or to the genus *Canis*. It seems to be intermediate between them."

This *Official Guide*, with additions and alterations made at irregular intervals, was the property of the Society, and the revenue from it was £288 in 1829, rose to £369 in 1831, and then dwindled gradually until 1847, when it vanished.

In the first few years of the existence of the Society, the Council received applications from various firms to publish illustrated accounts of the Menagerie, but they do not seem to have given consent to these, on the ground that an authoritative work of the kind was in preparation. In 1830, however, a little volume was published by Marsh and Miller, of Oxford Street, under the title " The Zoological Keepsake ; or, Zoology, and the Garden and Museum of the Zoological Society, for the year 1830."

The author's name is unknown ; the preface is signed by the initial M, but in a contemporary advertisement, Edward Augustus Kendall was described as the editor. As an article entitled " Lord M. and his Baboon," by H. M. Montagu, is included, this may be the full name of the author, but I know nothing of him. The text is of the most popular and vivacious kind, but is at least as accurate as the lighter accounts of animals written in the Press by contemporary authors. Many verses are included, some serious, others gay. The following is a fair sample of the latter :—

In short, whatever folks might race
In Noah's famous ark
(If ever there was such a place),
Are here in Regent's Park.

All things that move on fin or wing,
That hop, or jump, or crawl—
Ladies and Gentlemen, walk in,
And you shall see them all.

But if you wish to see them best,
Go at their hour of baiting,
For then, to give a great zest,
The *keeper keeps* them waiting.

They make no bows, they say no grace,
They make no bore and bother
About precedency and place
Nor speechify each other.

But with a glorious appetite
That scorns all dinner-pills,
They clear away both left and right,
And then they pay no bills.

There is a perspective view of the Gardens, reproduced as Plate 3 of Scherren's book, competent woodcuts of houses and animals, spirited little tail-pieces by Sears, and an amusing caricature signed by R. Cruikshank, that is to say Isaac Robert Cruikshank, the older brother of the more celebrated caricaturist, George Cruikshank.

In 1830 and 1831 appeared the two volumes of "The Gardens and Menagerie of the Zoological Society Delineated." Published, with the sanction of the Council, under the superintendence of the Secretary and Vice-Secretary of the Society. It was printed for the proprietors by C. Whittingham, of Chiswick, and published by Thomas Tegg, of Cheapside. The preface to the first volume, "Quadrupeds," is signed by E. T. Bennett, the Vice-Secretary, and the volume is probably his work. He pays tribute to Broderip and Yarrell. The preface to the second volume is unsigned, but the editor states that he has followed the classification "developed by Mr. Vigors in the fourteenth volume of the Linnean Transactions." The style shows it also to be the work of Bennett, and it is probable that

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WILLIAM YARRELL
Secretary, 1836–1838

Vigors, in a characteristic fashion, content with having his position acknowledged on the title-page, left the work to others. The two volumes were careful zoological treatises, with illustrations in the form of excellent woodcuts of the animals, but no plans of the Gardens or illustrations of the houses.

I can find no trace of any official Guide in the middle years of the century until 1851, the year of the Great Exhibition, when a twopenny leaflet was sold giving a plan of the Gardens, including the house for Gould's Humming Birds, and a list of the houses and enclosures.

In 1852 D. W. Mitchell, the Secretary, produced at the request of the Council, a "Popular Guide to the Gardens of the Zoological Society of London, printed for the author and sold at the Society's Gardens in Regent's Park." It contained an excellent plan, a description of the animals arranged in the order of a tour round the Gardens, and a number of wood blocks. The intention was that it should be kept up to date by the printing of new editions with the alterations that had been made in the disposition of the Gardens and the actual stock. Apparently it was allowed to fall out of print, and at the Council Meeting of December, 1857, it was proposed that a Guide should be published by and for the Society. Sclater, however, who at that time was already a Member of Council, carried an amendment that "the Secretary undertaking to complete and have ready for sale a Catalogue of the Gardens before Lady Day next, the publication thereof be left in his hands." It was an act of prevision, for in less than two years, when he became Secretary, he succeeded to the arrangement and drew the profits of the Guide throughout his tenure of office. Mitchell's new Guide duly appeared under the title, *Guide to the Gardens of the Zoological Society of London*, by D. W. Mitchell, B.A., F.L.S., Secretary to the Society. It was published by Bradbury and Evans. It described

a route by following which a visitor might visit all the houses and enclosures in turn, gave brief accounts of the different animals and of the houses, and was illustrated with a plan and numerous woodcuts. Next year the Guide appeared in the same form, but with the addition to the title page of the words, "A New Edition, Corrected according to the present Arrangement of the Gardens, by Philip Lutley Sclater, M.A., Fellow of Corpus Christi College, Oxford, etc., etc., etc., Secretary to the Society." It appears to have been reprinted several times, for the Guide for 1860 is called the sixth edition and also bears the words, "The only Edition authorised by the Society."

Additions and slight alterations were made to the text, new figures were added, and the Garden Plan was changed from time to time until, in 1903, the fifty-eighth edition appeared, edited by W. L. Sclater, who was Secretary for the first four months of 1903.

In 1903 the Guide was taken over by the Society and since then I have prepared it. I replaced the old wood blocks by blocks made from photographs of animals actually living in the Gardens, re-wrote the text, and added to the Garden Plan a plan showing tramway and omnibus routes to the Gardens. I arranged that there should be a new edition each year, brought up to date so far as possible. Since 1924, until the end of 1928, 1,336,096 copies have been sold, and the profit to the Society from this new source of income has gradually increased from about £1,000 a year to nearly £3,500 a year.

Chapter VI.

DEVELOPMENT OF THE GARDENS TO 1913.

Practically none of the details of Decimus Burton's design for laying out the Gardens, published in 1827, was carried out, and the portion of land on the north side of the Outer Circle roadway was not obtained for some time later. It will be noticed, however, that the Terrace Walk, leading from the Main Gate, has been preserved, and that the tunnel under the road occupies the place he designed for it. There is a curious history connected with the terrace. Burton designed it as a House for Carnivora, facing south-west, with dens under the raised terrace for the animals, open-air yards in front of each den, and a sunk area for the keepers along the front of the open-air dens, separating the public from the animals on a kind of Mappin Terrace plan. An elevation printed at the time shows that the building was graceful, and the details that it was practical. But when the Council came to the point of ordering construction, there was a battle between the open-air school and those who believed that heated dens or houses were the fundamental necessity for animals in captivity. The advocates of heat triumphed, and the Carnivora for some years were housed in the Repository, a closed and heated building, afterwards added to and turned into the Museum and Lecture Room on part of the site now occupied by the Offices. In 1842 there was another struggle between the fresh air and the heating factions, and it was decided to build a Carnivora Terrace in which the animals should have small inner dens and outer dens roofed over but exposed to the open air and without artificial heat of any kind. As a result, what was afterwards known as the Bears' Terrace, a small fragment of which now remains, was built on the site

of Burton's proposed terrace, but designed by a different architect, a Mr. Elmslie. It was an unhappy experiment, as the structure was ugly, the dens dark, small and draughty. To remedy the latter defect a glass screen was added in front. When, many years afterwards, the President and I were urging the Council to demolish the terrace, we were reproached with wishing to destroy the work of a great London architect. By a fortunate accident, a drawing of Burton's design was presented to the Society, and it became at once apparent that we were not proposing to commit an architectural crime of vandalism.

In 1828 another sketch plan, differing slightly in detail from Burton's original sketch, was prepared, covering only the part of the Gardens lying to the south of the Outer Circle (Plan, 1828). This also does not seem to have been carried out closely. In the first real Guide to the Gardens, published in July, 1829, appears the first actual Map (Plan, 1829). It shows an Entrance Lodge in the position of the present Main Gate, leading by the Terrace Walk to the Bear Pit, a structure which survived until 1910. Then follow miscellaneous sheds, and the floor of what was intended to become a repository, or house for any kind of animals not specifically provided for. I do not think that any of the other buildings or ponds have survived.

In 1830 it was decided that no surveyor or architect should on any occasion be paid by a percentage charge on disbursements or tradesmen's bills—clearly architects were not then so powerful a profession as they are to-day, and Mr. Decimus Burton was appointed architect to the Society at the fixed annual salary of £150. He was to have the sole direction of all future buildings and alterations, the bills and accounts for which were to be examined by him previously to their payment. I have not discovered when he ceased to act for the Society, but, before long, work was certainly carried out by less skilful hands.

Meantime, the Council had come to a "permanent and satisfactory arrangement" with the Board of Woods and Forests for the secure occupation of the Garden within the Park, and also for other land on the North side of the road (what is now called the Middle Garden, between the Outer Circle and the Canal). Trouble had risen between the Council, the Office of Woods and tenants of the Crown inside the Park, and the Council stated that if their plans had "appeared to want unity of design, it must be attributed to the frequent interruptions they experienced by the circumstance of their legal right being called in question." The tenants of the Crown could not interfere with any buildings in the North Garden and the Council announced their intention of ultimately placing there the principal part of their establishment, "avoiding, however, the erection of any buildings which shall be unsightly or objectionable." A tunnel (the present "old tunnel") was built under the road to join the two portions of the Gardens, and a Repository was built in the North Garden. A very early building, shown in sketches dated 1830, was a curved aviary with fluted columns, representing palm stems, from its beauty almost certainly the work of Burton. It was used for various purposes in its long career, first as an Aviary for Small Birds, for which it was well adapted, later as an Eagle Aviary, for which it was certainly not suited, in 1862 as a Winter Aviary, again for Small Birds, and from 1884 to 1912 for Small Mammals, such as Civets, and afterwards as an Aviary, being kept in existence long after its usefulness had ceased, because of its historic interest. In 1922, however, it had to be taken down, when the new Tea House was built. In 1834 ten additional acres were granted to the Society on an annual rental, along the south-western margin of the Gardens, and for a considerable period were occupied only as pasture land.

It would be tedious and unnecessary to try to trace the changes made in the Gardens from year to year,

and I propose therefore to take plans of the Gardens at successive intervals and comment only on the main features. A general observation, however, has to be made. Although a general plan was made by Burton, and afterwards on more than one occasion by others, these in practice have not been adhered to closely. Throughout their existence the Gardens have been actually in occupation by animals and by visitors, and temporary expedients due to such occupation, to financial conditions, to the sudden need for some special building (as, for example, on two occasions, one in very early days and the other so recently as in 1926, when a serious epidemic amongst the monkeys made it necessary to give these animals precedence in a proposed orderly scheme) and to additions to knowledge, or changes in the conception of the conditions most suitable to particular animals. As the space occupied by the Gardens grew more crowded from year to year, arrangements made on broad principles in earlier years ceased to be practical. At one time I had the idea that, to provide for changes in the mode of installation, every new building should be built of the lightest materials and in blocks of five or six, one block to be taken down and rebuilt every year. On some such an arrangement, the almost inevitable depreciation in the sanitation of a house occupied by human beings or animals would have been guarded against, and there would have been scope for new ideas. But the London Building Acts, financial considerations and the conservatism of my colleagues prevented such a scheme from ever passing beyond the stage of the most casual consideration.

The Plan of the Gardens in 1851 (Plan, 1851) presents familiar features to those who have been Fellows for at least a quarter of a century, with the striking exception that there was nothing on the north side of the Canal, as the land had not been acquired then. Turning to the right at the Main Gate, there is to be found the New Aviary, one of the first of D. W. Mitchell's build-

ings and the greater part of which still survives as the Western Aviary, behind the Mappin Terraces. Turning to the left, there comes a great area now completely occupied, but then only in the form of open paddocks, but with the temporary house for Gould's exhibition of Humming Birds marked on it, the Terrace (No. 10), afterwards the Bears' Terrace, and the Bear Pit (No. 11), I have already mentioned. No. 13, the Camel House, with its Clock Tower, is another of Burton's buildings, constructed before 1829, and still retained. No. 14 is a small cage which still survives as the Ravens' Aviary. It is one of the very old structures in the Gardens, and was designed originally to house a pair of King Vultures. No. 16, surviving almost unaltered as the Pelicans' Enclosure, was made as a winter house for Emus. No. 17, the Weeping Ash Pond, has disappeared, but the trees remain forming a pergola between the Great Aviary and the Eastern Aviary. No. 21, the Eagles' Aviary, survived until 1911, when it was long overdue for demolition. No. 38, the Three Island Pond, another very early feature, still survives. No. 44 was one of the earliest of the Refreshment Rooms; in 1851 it was sub-let to a Mr. Masters, of Oxford Street, who paid a rental to the Society of £514 annually. No. 45 was the second Monkey House, built in 1839. The first had been built in 1833, to a design by Burton, elegant externally, but over-heated and without external cages. There were complaints from ladies who had their dresses torn, and of visitors generally because of the smell. Scherren quotes a letter from the *Zoological Magazine* of 1833, which he attributes to Owen, suggesting that instead of the monkeys being kept in twos and threes in small separate cages, they should be given a "large space, well ventilated and heated, and defended by a glass frame" in which they could "disport and exercise themselves throughout the whole winter." The 1839 House, although more convenient and larger, was still on the over-heated system, and next year, in

consequence of an epidemic, the Council added open-air cages.

The Reptile House (No. 49), with the Python House on the south side of it (No. 53), were constructed in 1849 and 1850 on part of the site of the Repository, where the Offices are placed now. The Museum (No. 50), was formed out of the old Repository when the Carnivora were removed from it. By 1851 the more valuable part of the collections had already been dispersed to the British Museum and other institutions. Surrounding these two buildings were a number of small sheds occupied by deer; part of them survive as the present Kangaroo sheds. At the end of 1851, Gould's Humming Bird House had been taken down and re-erected in what is now the middle Garden. It was used (No. 53) as a Parrot House, and with the addition of external flight cages and internal modifications has remained the Parrot House up to the present. It was intended to replace it by a new building in 1928, but the available funds were required for other purposes. No. 59 was constructed in 1832 from the designs of Burton, for an Elephant and a Rhinoceros; it occupied approximately the ground immediately to the west of the present Elephant House, the site of the latter being filled for many years by a house for Deer and Zebras. In 1851 there was an example of the now extinct Quagga, exhibited in it. The large block numbered 62 has been altered only in minor details since 1851. It contained then the Superintendent's House, a house for Small Mammals, and sheds for Kangaroos and Antelopes. The next large block, with railed paddocks in front (Nos. 63, 64 and 65), still survives with only slight alterations. The oldest part is that which has always been occupied by Giraffes; it was built for these animals from a design by Burton in 1837. The first Giraffe known to have reached England alive was a female, presented by the "Pacha of Egypt" to King George IV, which arrived in bad condition at Windsor in 1827, but lived only a very short time. In 1835 the

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D. W. MITCHELL
Secretary, 1847–1859

Society arranged for the capture of Giraffes in Kordofan ; a female and three males were obtained by Thibaut, who had been employed for the purpose. The animals were wintered in Malta, and reached the Gardens safely in June, 1836. As soon as the new house was ready they were moved to it. The little herd throve ; young ones born were successfully reared and some of them sold. In 1851 the herd at the Gardens consisted of three males, born in the Gardens, their mother, the original female, and two younger females, imported later.

The part of the building occupied then and now by Hippopotamuses was built in 1850 to accommodate a young animal captured in the White Nile, near Obaysch. It was believed to be the first hippopotamus imported alive to Europe since the Imperial Exhibitions in the arena of Ancient Rome.

The Plan of the Gardens for 1859, the last year of Mitchell's secretaryship, shows changes only of minor importance and need not be reproduced. The Antelope House had been planned and the first portion of it, the shorter, or western wing of the present house, was completed. There was also added an " Aquavivarium," known later as the Fish House and still surviving as the Diving Birds' House, near the Great Lawn. It was erected in 1852 and will be described in another chapter (p. 172).

The plan for 1869 shows some important changes. The Monkey House, which was replaced in 1927, was completed in July, 1864. It was much larger than the building it replaced and was described as having been build on entirely different principles. It was " fitted up in the style of a conservatory, so as to be as light and sunny as possible, and to reproduce as nearly as may be the circumstances under which its occupants live in their native haunts." There were large central compartments in which individuals which could be got to agree were kept together, and the walls were lined with small separate compartments. But the belief in warm air

dominated the construction; there were no outdoor cages; double doors kept out as much fresh air as possible, and only a small proportion of the monkeys got the benefit of direct sunlight. The spare compartment at the back of the building, where pet monkeys and sick monkeys were kept, was dark, badly ventilated and over-heated. The Antelope House had been completed by the addition of the southern wing, this now being called the Antelope House, the original wing the Zebra House. A set of Cattle Sheds had been constructed in 1864 (No. 33), and Deer Sheds (No. 32) in 1867, which survived until they were rebuilt in 1906. The main portion of the Refreshment Rooms (to be replaced by a new building in 1929) had been built in 1861, and the Aviary, now called the Eastern Aviary, had been rebuilt.

The most important change is the appearance of the present Elephant House (No. 56). The plans were prepared for the Society by Anthony Salvin, Jun., and the construction was begun in 1868. The portion for the Elephants was completed in 1869, and the accommodation for the Rhinoceroses a little later. The outside Paddocks and Bathing Pools were added still later and do not appear on the Plan.

In the Plan for 1879 (Plan, 1879), the most important changes are the appearance of the Lion House and the addition of ground on the north bank of the canal forming part of the present North Garden. In 1868, A. D. Bartlett, the Superintendent, had been sent to inspect and report on the Lion Houses in Berlin, Amsterdam, Rotterdam, Hamburg, Antwerp and Paris, but it was not until 1874 that the plans prepared by Anthony Salvin were accepted by the Council. The house was finished in 1876, and was believed to be the "most perfect building for the accommodation of the larger Carnivora ever erected." From the point of view of visitors it has certainly been good, but even with the changes made in it in recent years, notably

improving the lighting, it has never been a really successful house. Surprising defects were the placing of the outdoor cages on the north side where very little sun reached, the absence of cover from rain in these outdoor shelters, and the extreme difficulty of providing quiet inner compartments for breeding.

The other important change shown in the 1879 plan is the use of part of the land on the north of the canal, the construction of an Entrance Gate to the Albert Road, and of a footbridge across the Canal. The Council obtained leave from the Commissioners of Works to resume tenancy of the strip of land on the other side of the Canal in 1869, such leave having been granted many years before and then rescinded. A Lodge was erected at the North Gate, the small range of brick-and-stucco buildings (No. 42) facing the Canal Bridge and still in use as the Civets' House, was built for the accommodation of Hawks and Kestrels, and a small house (No. 43), which has long since disappeared, was constructed for some of the Giant Tortoises from the Aldabra Islands.

The Gardens in 1889 showed some minor changes, and the great addition of what was then called the new Reptile House. The original Reptile House was a small structure built in 1849, and was one of the earliest attempts to display reptiles in captivity. The great increase of revenue in 1882, due to the popular excitement over the sale and departure of "Jumbo," placed the Council sufficiently in funds to proceed with a building that they had been considering for several years. The plans were made by Mr. C. B. Trollope, and the house was finished in a little over a year. It was a large hall (the present New Bird House) with roof lighting, central pools for Alligators and Crocodiles, relatively large glass-fronted dens for the larger Snakes round three sides of the building, and table cases along the south wall. A cooler entrance-lobby gave accommodation for table cases for

Amphibia. The floors of the cages were made of slate, under which there was a space with hot-water pipes. A service passage ran round three sides of the building behind the larger dens.

In its size and general arrangements this house was a great improvement on any that had been built before, but it had grave defects and the more delicate reptiles seldom lived long in it. There was no way of regulating the heating except by "stoking up" more vigorously, and, even with new circulating systems which were put in from time to time, the temperature was apt to fall too low or to rise to such a degree that it was thoroughly uncomfortable for visitors. The lighting was wholly inadequate and there was no ventilation of any kind in the large dens. The accommodation for keepers was bad, and there was no separate place for the treatment of sick reptiles or for the unpacking of new arrivals. The passage under the floors of the dens in which the hot water pipes ran were almost inaccessible for cleaning, and soon became a harbour for dust and vermin. The house was overrun with cockroaches, but, in spite of its defects, the Reptile House was a great attraction to the public and remained so throughout its existence.

In 1889 there was another new feature, the Insect House (No. 44, in the North Garden, now used as a house for Small Rodents). This originally had been part of the Refreshment Rooms in the South Garden, but in 1881 it was re-erected on its present site. It is of interest to note that just as the Society had opened the first Reptile House in any Zoological Gardens in 1849, and the first Aquarium in 1853, so this was the first Insectarium. It was simply a glass and metal greenhouse, kept at a high temperature, and arranged with cases on tables round the walls and down the centre. There were a few cases arranged as aquaria for Caddis Worms and Dragon Fly larvæ. It was placed in charge at first of William Watkins, a competent

practical entomologist and the author of a small *Guide-Book to the Insect-House in the Gardens of the Zoological Society of London*, first published in 1881 at the price of 2d. and reprinted, with some alterations, in 1886. A large number of beautiful moths were reared in it from imported pupæ and a good series of British and European insects were exhibited from time to time. Scherren quotes from a contemporary writer that one case contained plants infested with green-fly, with which were exhibited the larvæ of Ladybirds which preyed on the green-fly, seizing them "with much the same habit as a dog would a rat." Now that economic entomology has a large and important branch devoted to study of the natural enemies of insect pests, this early exhibition is of special interest.

I reproduce the Plan (Plan, 1902) published in the Guide, issued early in 1903, as it indicates the condition of the Gardens at what was the end of one phase of the Society's existence, and as it will recall many buildings and arrangements familiar to the older Fellows of the Society. The Prosector's Office and Dissecting Room, behind the Swine's Sheds (No. 6), are not shown on the Plan, but were the scene of distinguished anatomical work by a number of persons. The New Ape House (No. 3A) had just been completed at great cost. It was a supreme example of the belief that anthropoid apes, like other denizens of the tropics, required, above all, protection from cold. It consisted of a large hall for the public and four roomy compartments for the Apes, raised on a platform and shut off from visitors by a glass screen, in order to protect the animals from infection, in especial, tubercle and colds conveyed by visitors. The south wall contained very large windows by which sunlight came directly into the cages. A small service passage ran between the windows and the cages, which on that side were unprotected by glass screens. In the basement were the heating apparatus, the keeper's rooms and kitchen, and several small and very badly lighted rooms in which young or

tamer Apes were kept. In theory, the glass screens kept off infection, but in fact visitors were taken regularly behind the screens and to the basement. Without doubt, the glass screens kept the animals secure from injudicious feeding, but on the other hand their separation from the attentions of visitors led to a good deal of moping. Later on some improvements were made ; notably the introduction of a system of ventilation, which seems to have been omitted from the original plan, with the object of preventing any chance of draughts, and a few open-air cages were added in front so that the smaller Apes, kept in the basement, could occasionally get fresh air. The house was certainly an improvement on its predecessor, and two Orang-utans and a Chimpanzee both survived in it for a greater length of time than any others in captivity in any other menageries. But the average health was bad.

The Great Aviary (No. 17), which still exists, was originally a large space with ponds, uncovered, and therefore used only for pinioned birds, but was wired over in the eighties, and has ever since been a great attraction. The Tortoise House (No. 33A), a glass building behind the old Reptile House, and now used for any young Mammals requiring heat, was built in 1897, the Hon. Walter Rothschild (now Lord Rothschild, F.R.S.) contributing £150 towards its cost. The Zebra House (No. 64) was built in 1888–9, and the Northern Pheasantry in 1900. The Fellows' Pavilion, which is not shown on the Plan, and the Llama House (No. 22) were built in 1898, both to the plans of a son of the late Sir William Flower, the Llama House being placed on the site of a much older building which had been used both for llamas and for cattle.

In 1903, after the excitement of the contested election for the secretaryship was over, the new Garden Committee, with Mr. de Winton and myself, at once got to work on the Gardens. Unfortunately, there was little money in hand, and a very large amount had to

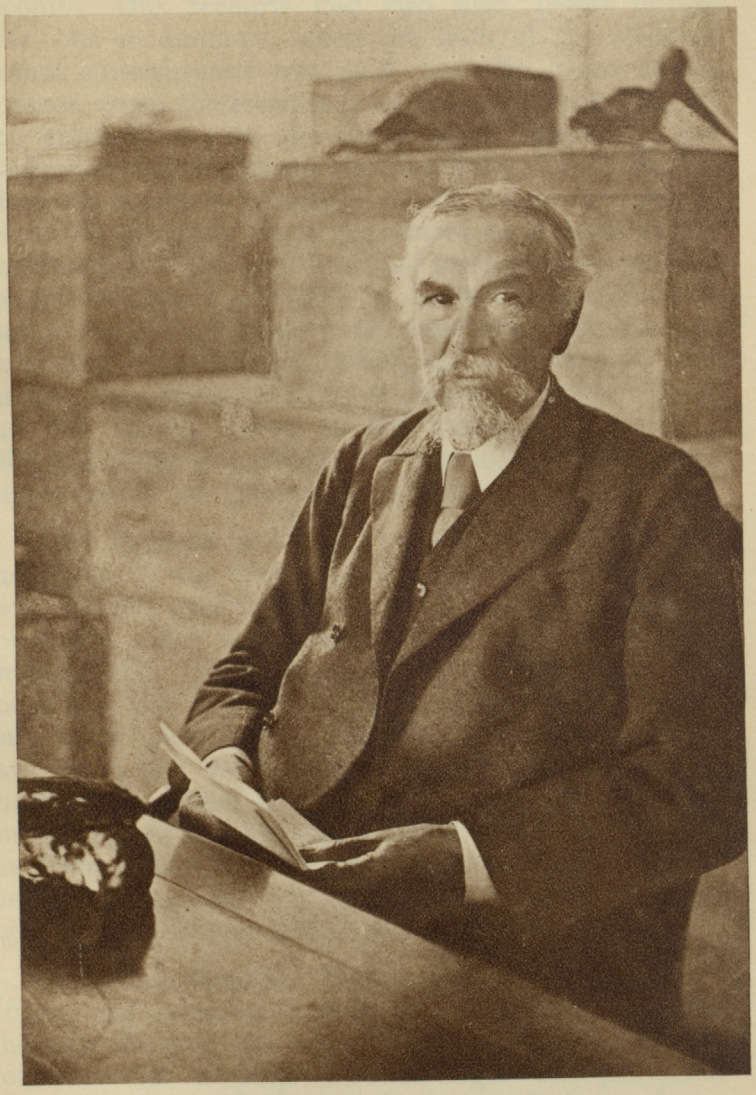
be spent on making up arrears of painting, general repairs and replacements so that little in the way of new buildings could be done with the money actually in hand. The Fellows, however, had expressed their approval of the clause in the report of the Committee of Re-organisation, appointed in the end of 1902, that no "effort should be spared to bring the Gardens into a condition worthy of the Society."

The order in which improvements could be undertaken was determined chiefly by financial considerations. But it was found possible to bring into use a waste part of the North Garden, beyond the Insect House, and to erect there a set of well-ventilated stables which relieved the congestion in the Wild Asses and Zebra House and released some valuable animals from an old stable in the service yard. The strip of land from the Canal Bridge towards the Insect House was cleared of undergrowth and laid out with small ponds, as the existing Cranes' Paddocks. In the Middle Garden a large Flying Aviary was constructed on the slope of the Canal bank, near the Elephant House. In this, many Parrots, Cockatoos and Parrakeets were placed, and London visitors for the first time were able to see birds, which they knew only in cages or chained to perches, flying in full freedom. A site on a slope facing north was not ideal, and there were the usual predictions of disaster from the hot-air school. But it was the only site available at the time, and the birds throve, even during the winter, although they rapidly ruined the amenities of their enclosure by destroying, with a minute attention to detail, every tree, shrub, or shoot within their reach. An open-air paddock was provided for the Kangaroos, by clearing and making use of an overgrown shrubbery, and these animals, again, were provided, for the first time for more than half a century, with a paddock in which they could display their movements. Opposite the Kangaroos' enclosure a large wire enclosure, with a small wooden kennel, was provided for animals such as Snow Leopards and Lynxes, without any heating arrangements.

In the South Garden little could be done except a very extensive series of repairs, but the old Fish House was fitted up with a large tank for diving birds. The shape and dimensions of the glass sides of this were determined by the size and shape of the house and were not "standard." I tried, without success, to get what was required from British makers, and, after some time I was called on by the agent of a German firm who had heard, by some means, of what was required. He offered at once to have the glass panels cut and delivered in London at a reasonable price. I explained to him that it was an isolated order and was unlikely to lead to other orders, but he replied at once that his firm did not take a narrow view but found that it paid, independently of the immediate profit or loss, to supply whatsoever any user might require. It was a characteristic example of the methods by which Germany found her way into world markets.

Much work was carried out in laying new drains, and the protection against fire was greatly increased by the provision of hydrants, fire-extinguishing apparatus, and the establishment of telephonic communication between central points in the Gardens, the Superintendent's House and the London County Council Fire Station.

The President, the Garden Committee and other individual Members of Council were now taking a most active interest in the Gardens, and it was evident that the improvements in the general arrangements for the comfort and display of the animals and for the convenience of Fellows and visitors were likely to increase the prosperity of the Gardens. Early in 1904, with the sanction of the Council and through the good offices of the Treasurer, I was able to arrange with the Society's bankers to overdraw on the current account up to a maximum of £10,000 at any time. Hitherto, money had been advanced to the Society in fixed amounts at fixed rates of interest, independent of the state of the cash balance on the Society's general



From a Photograph lent by W. L. Sclater

P. L. SCLATER, D.Sc., F.R.S.
Secretary, 1859–1902

account. Our receipts had two high peaks in the year, one in January, when the bulk of the Fellows' annual subscriptions was paid, and the other during summer, when the receipts from the gates were highest. The expenditure, on the other hand, especially that incurred on new buildings, was inevitably low in winter, when the weather prevented much work, and in the height of summer, when the crowd of visitors had a similar effect. The new financial arrangements made it possible to frame a budget in advance, and the new confidence of our bankers in the prospects of the Society emboldened the Council to advance more rapidly with Garden improvements so as to increase the attractions and the earning power of the menagerie. In 1904, 1905 and 1906, accordingly, we were able to make some improvements of greater magnitude.

If the Gardens were to be properly cared for by day and night, it was vital that the Resident Staff should have suitable quarters. In 1903, the Superintendent's house and office were enlarged and made more comfortable. In 1904, the Assistant Superintendent's house was put in order (it is the Lodge at the North Gate, now occupied by the Head Gardener), and a bath room and wash-house were added. To supply quarters for a head-keeper and for resident unmarried young keepers and helpers, a Lodge was provided near the Main Gate, containing a separate small house for the head keeper, and a kitchen, scullery, common room, eight small bedrooms and a bath room for the men.

The Small Mammal House, now the Small Cats' House, was designed in 1903 and completed in 1904. The new feature was added that along the western front a series of large outdoor cages was provided, communicating with the interior by small doors placed high above the sleeping boxes. These outdoor cages were roofed with glass to keep the animals dry in the open air, and had branches and high shelves. They were made with movable partitions, the intention being

to be able to alter their size according to the animals that were to have access to them. The latter arrangement has not worked in practice, as to alter the partitions required too much rearrangement of the shelves and tree trunks. The house was a great improvement on the previous accommodation, but there was insufficient light, and, owing to the firm dislike of all keepers, and at that time most officials, to fresh air, there was too much heat and insufficient ventilation. In 1905, the Owls' House, which still exists, was constructed, each compartment having a large outdoor cage. It was placed facing south on the north bank of the Canal, and it is curious to recall that an ornithologist then on the Council objected to this situation on the ground that owls were "well known to dislike the light." In fact, a few of the smaller owls, especially the Barn Owls, come into the open chiefly early in the morning or at dusk, but by far the greater number, especially all the Eagle Owls, take constant advantage of sunning themselves on their open-air perches. The great Southern Aviary and the Sea Lions' Pond were constructed in the same year, and, when the old Sea Lions' pond had been demolished, the very large space it had occupied, at the special suggestion of the President, was turned into an open-air paddock for the larger antelopes. The Southern Aviary was arranged with ponds and rockwork so as to be suitable for gulls, herons and other aquatic birds which hitherto had been exhibited only in a pinioned condition. The new Sea Lions' Pond, with its rockwork and diving platform, became an immediate success. Another novel and attractive installation was the Waders' Aviary, set up first on the north side of the Lion House, but moved later on to its present position near the Cattle Sheds. It contained a pond with a shallow sandy edge, a deep water portion, a mud bed and abundant cover in the form of shrubs. Here also birds which formerly had been pinioned or kept only in very small cages were displayed almost under natural conditions. In 1905, and the winter of 1906, the new

bridge over the canal at the extreme west end of the Gardens was constructed (*see* p. 151), and the new part of the North Garden brought into use and laid out for the Prince of Wales' Indian Collection. The very old cattle sheds in the South Garden were cleared away and a new range of buildings was erected parallel with the Deer Sheds, the latter being re-roofed and otherwise improved, and a set of paddocks arranged round the building. In 1905, Mr. C. Czarnikow, a Fellow who visited the Gardens every Sunday and whose friendship I had made, was good enough to give a donation of £1,000 to provide a house suitable for the exhibition of tropical birds and cage birds. This was completed in 1906, and fitted with outdoor aviaries. It was supplied with heating and ventilating on the "Langfield" system, by which a current of filtered, warmed and moistened air passed continuously through the building. The system, however, never found favour with ornithologists or with the staff, and whether because of its inherent defects, or because in practice, persons in charge will not give a system in which they do not believe adequate attention, it was not a success, and was replaced not long afterwards. In the same year a new pond for the Otters, with island rockwork, was built. There was trouble with tuberculosis in the Monkey House, which was emptied, stripped, disinfected and provided with new cages.

Thus, in the years from 1903 to 1906, not only general repairs and minor improvements were carried on throughout the Gardens, but very many important installations were introduced. The dominating features of the latter were giving the animals more access to fresh air and more opportunity of displaying their natural activities. Without doubt, these changes, as well as the improvements of a more general nature, were increasing the Society's income, partly from a larger number of new Fellows being added to the list, and partly from the direct expansion of receipts from gate money.

With the increase of large aviaries and other arrangements where individuals representing different species were kept together, the problem of labelling became acute. When, as in a museum, species are exhibited separately, a printed or written label giving the popular and scientific names of the species is sufficient. When species are mixed, printed labels are a guide only to experts. The ideal was to provide coloured labels, giving pictures sufficiently accurate of the different species to make it easy to identify them. The old system of oil-painting on metal plates was not satisfactory and the colours faded very rapidly on exposure to the air. Very many different devices have been tried since then, but so far no satisfactory solution has been found. For a time waterproofed frames enclosing water-colour drawings or coloured prints seemed a way out, and the President very kindly paid for a large number of the drawings. But the colours faded in the sunlight even when sealed under glass, and one way or another damp oozed under the glass and caused quick deterioration. Another hopeful device was covering the paintings with a film of cellulose dissolved in a medium which evaporated quickly. This defeated damp, but the cellulose turned yellow and cracked. With the aid of the London County Council School of Arts and Crafts, the Director of which took a lively interest in the matter, extensive experiments were made in the direction of painting on tiles with fusible enamel pigments and firing afterwards. A set of Art students from the College learnt the method, and made a number of paintings here. After some trials, in which the pictorial glaze was found to crack after exposure to the weather, a satisfactory technical method was found. But a further difficulty arose. It was possible only in a limited number of cases to provide coloured drawings from which the students could work, and, even in these cases, students, unskilled in natural history, lost a good many of the distinctive features in the process of making simplified copies in a new medium.

It appears to be necessary for success to have the services of an artist skilled in natural history and willing to adapt himself to the technical process. It happens, moreover, that few persons have the ability to draw with equal success from living mammals, birds, reptiles and fishes. The Society has now set up a small firing stove in the basement of the Offices, and a certain number of satisfactory porcelain tile labels are being turned out. The final difficulty, however, is that these tiles have a great attraction for thieving visitors, even if pliers have to be used to detach them from their moorings to the cages.

Another difficulty arising from the new system is a little damping. It was easy to repel the objections of those who wished zoological collections to be arranged like the cases in a museum, with the different species arranged each in its separate compartment, in rows, so that comparisons might be made and systematic knowledge acquired. That was not the distinctive object of a living collection, but on the contrary, even at the expense of limiting the numbers of species shown, it was our duty to give space sufficient for living animals, as fully as possible to show their living activities.

The scientific success of Zoological Gardens was to be judged, not by the number of "species new to the collection" which it might be able to show, even for a few days, each year, not by the extent to which the range of a genus was shown by exhibiting a large number of the different species included in it, but by the length of life and apparent happiness of the individuals shown. Better a number of individuals of the same species in one large cage or compartment, than a number of small cages each with its one or two individuals. But here the experienced amateur, especially the ornithologist, came to the reinforcement of the small cage view. He insisted that, as a matter of experience, most mammals, birds and reptiles did better in small cages, almost in proportion to the

smallness of them. I found by observation that there was a good deal to be said for the view, partly because the inhabitants of small quarters became more tame, partly because the smaller the cage the better attention it received in the way of sanitation. Moreover, in the larger assemblages of individuals or species, there was usually a good deal of quarrelling, fighting and bullying, and, if one notorious bully were removed, too frequently the next in order of size and pugnacity took on his predecessor's habits. In short, I am not prepared to say that large quarters where many individuals are kept together secure a longer life, or in all cases a happier life. But, on the whole, it is a more natural life, and the quarrels of creatures are as much an exhibition of their natural qualities as are their patterns and colours. The advantages and disadvantages must be weighed in each case, but I am certain at the least that all who have charge of animals will agree on the necessity of providing a certain number of small cages or compartments, or paddocks, for the occasional segregation of individuals.

In 1907 an important extension of the area occupied by the Society was obtained, and it may be convenient here to summarise the past history of the Garden area. In 1826, after long negotiations, a grant of twenty acres, to be held on an annual agreement, was made to the new Society by the Crown authorities. This land lay on both sides of the Outer Circle, corresponding roughly with the existing Middle and South Gardens except for a portion to the south of the present Terrace Walk. In 1829 the old tunnel was constructed, but the land across the Outer Circle was not laid out for some years. In 1834, ten additional acres to the south of the Terrace Walk were added, but on the condition that the land was to be used only as pasturage. In 1839, use of the strip of land north of the Canal, corresponding with the existing North Garden, was granted. In 1841 the ground occupied by the Society was rearranged ; the strip north of the Canal was surrendered

and a portion at the east end of the Middle Garden was exchanged for a corresponding area at the west end, and permission was given to extend buildings over the ten acres granted in 1834. In 1869 the land on the north side of the Canal was again taken over by the Society, but little use of it was made until after 1903, when the provision of open-air facilities for the animals was made a policy. Full use of the North Garden was possible only after 1905, when the new Canal Bridge was built and two small portions of land were rented to the Society to give access to it at either end.

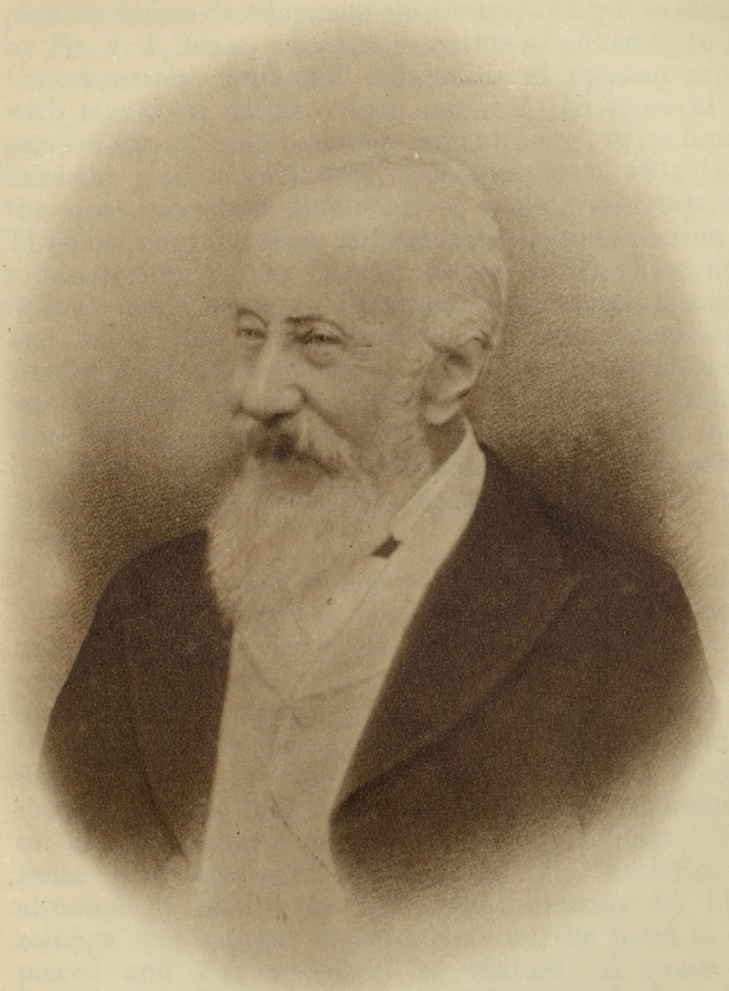
In 1907, Mr. L. V. Harcourt (afterwards Lord Harcourt), who was H.M. First Commissioner of Works and took a great interest in the Gardens, agreed at my suggestion to give the Society the use, at an annual rental, of a strip of ground along the southern boundary ending in a large triangular area towards the west, hitherto used only as a service-yard in connection with the Park, on the condition that the animals placed over the greater part of the long strip should be freely visible to the public in the Park outside the Society's boundary. The whole of the new ground was fenced in at the Society's expense, and, in 1908, Cassowaries, Deer, Antelopes, Llamas, Wild Sheep and Emus were put in the new paddocks. The occupants of these paddocks, visible from the Park, have been changed from time to time. The cost of the new bridge and of fencing and laying out the new ground absorbed all the funds available for new works, and during 1907 only minor alterations were made.

The success of the Prince of Wales' Indian Exhibition had done so much for the Society that we arranged to have a special exhibition of Australian and New Zealand animals in 1908. Mr. Seth-Smith, the Curator of Birds, was sent out to Australia to co-operate with the Zoological Gardens and other authorities who had most kindly agreed to assist in making the collection. To prepare for the display of the collection, as well as

to make a permanent addition to the accommodation for animals, the two ranges of brick buildings with open-air compartment known now as the North Mammal House were erected. As the available space was narrow, the principle was adopted in these buildings of not arranging for visitors inside the house, which contained only the inner compartments for the animals and a service passage for keepers. The animals soon learned to make use of the open-air compartments in which they could be seen by visitors.

In the South Garden the very old Wolves' and Foxes' Dens were improved to some extent by building open-air compartments along the south side to which the animals were given access by passages over a central service passage. At the same time small kennels and shelves were provided in each compartment. Although in appearance this house seems quite unsatisfactory, its occupants have thriven well and, when the opportunity of replacing comes, it will not be easy to design quarters that are in reality more suitable. Amongst the many minor improvements made in the year was the replacing of the cold floors in the Hippopotamus House by cork asphalte. In later years, experiments were made with a number of different materials with the object of providing floors and shelves of material more durable than wood and less heat-conducting and so warmer than stone or concrete. In the course of these it was discovered that any substances in any way impregnated with creosote or creosote-derivative substances were distasteful to all the cat-like carnivora, great or small.

In 1909 the Council began to realise that the changes being made in the Gardens ought to be in accordance with some general plan. It was recalled that, although Decimus Burton had prepared a scheme in 1826, this had been practically abandoned. From that time on, immediate convenience had taken precedence of any general scheme. Accordingly, the Council, after due



From a Photograph in the Society's Library

A. D. BARTLETT
Superintendent, 1851–1897

consideration of the existing buildings, had a general plan for future development drawn up, and put in shape by Mr. J. J. Joass, with the intention of adhering to it. Unfortunately, profound differences of opinion arose with regard to details which required the removal of some of the existing buildings, and although in its broad lines the plan was followed, it was not until 1913 that the more important differences of opinion were settled. The chief improvements in 1909 were the construction of a Sanatorium in the Reptile House Yard, where new arrivals could be quarantined and sick animals treated, and of a new Prosectorium and Anatomical and Bacteriological Laboratories. A new Stores Department was built and the ground for the Society's new Offices was cleared, so getting rid of a group of old and very insanitary buildings, the Marsupial House, Ant-eaters' House, Old Lecture Room, Squirrels' House and old Store Yards.

In 1910 the chief change at the Gardens was caused by the completion of the new Offices and Library, which were built to the design of Messrs. Belcher and Joass (*see* p. 60). A new pond for Polar Bears, with a rocky island covering sleeping dens, was completed early in the year on the new ground behind the old Swine's Sheds, cleared by the demolition of the old Prosectorium, and the removal of the Gardeners' department to new greenhouses presented by the President. The Polar Bear enclosure, designed by Mr. Seth-Smith, although it had to be surrounded entirely by high railings, was a great improvement on the pond it replaced and was a delight to visitors. A range of Aviaries for Birds of Prey was constructed along the eastern boundary of the Gardens.

The chief event of 1911 was the exhibition during the summer of a collection of animals made in South Africa for presentation to the King. These were arranged in temporary sheds on each side of the main walk from the Monkey House to the Elephant Walk,

with enclosures on the Great Lawn for some of the Antelopes. The exhibition was visited by the King and Queen, the Prince of Wales, Princess Mary and Prince George, and brought many visitors to the Gardens during the rest of the season. It was the largest single collection that had ever reached the Gardens, and much of its success was due to the ability of Major Stevenson Hamilton, a Corresponding Member of the Society, then Game Warden of the Transvaal, who made the arrangements in South Africa for the collection and forwarding of the animals.

In 1912 a collection of animals from Nepal, presented to the King, and another from the Malay Peninsula, presented by the Government of the Federated Malay States, were received and exhibited in temporary enclosures on the new ground behind the old Prosectorium. The most important events of the year were the announcement of two munificent gifts to the Society. In a visit that I had paid to the United States a few years before, I had been very favourably impressed by a House for Small Mammals in the Zoological Gardens at Washington. In it the animals were exhibited on a modification of the Aquarium principle, that is to say the part open to the public was shaded and the animals were seen against an opaque background lighted from above. I had a full scale model of a section of such a house set up in the Gardens in wood and canvas, and the Council had agreed to sanction the construction of a House for Small Mammals on these lines. I had added to the American conception, however, an idea of my own relating to open air and heating. Outside cages were provided to which the Mammals were to have free access through small openings. In each inner compartment, moreover, there was to be placed a very small sleeping box immediately under which hot water pipes ran. In that way the animals would have free choice of three temperatures, the temperature of the open air, even in cold weather, the slightly protected temperature of the interior of the

house, and the high temperature of the snuggery. The house was completed in 1913, and proved a success except that it has always been difficult to persuade the keepers to keep open the sliding doors giving access to the open air. As I shall describe later, this disadvantage has been overcome in the New Monkey House by providing swing doors which the animals can open and shut themselves.

My friend, the late Sir James Caird, visited me at the Gardens while the model was still on view and very generously gave us £1,000, which he increased by a later gift, to construct an Insect House on the same principle. The result was our present Insect House. Unfortunately, in translating the design into an actual building, the architect carried the roof lights only from the eves of the central passage, instead of carrying them in a wide curve high above it, and so shut off a good deal of direct sunlight and air space. There was a curious incident following the construction of these houses. Because of the shape of the available site, the Insect House and Small Mammal House were placed at right angles to each other in the form of the letter " L." The buildings were much admired by the authorities of another well-known zoological institution, who sent their architect to base plans for one of their houses on ours. Like the famous Indian tailor who made a new pair of breeches with a patch in the seat, following an old pair which he had been given as a model, the architect designed, and the Institution constructed, its new house on our " L "-shaped plan.

The other great gift, that of the Mappin Terraces, has also a history. On visits to the Continent, I had been much interested by the new panoramic methods of displaying animals, and, in particular, by the great scenic panorama of Carl Hagenbeck, near Hamburg, and that of the Gardens at Antwerp. Hagenbeck's structure was frankly theatrical scenery. He had plenty of space on his new ground, and the " rocks " were of

wood covered with a thin shell of concrete modelled over metal, the caves for the animals leading into dens not unlike those of a travelling menagerie. We had not sufficient space for his design, and the London Building Acts would have forbidden his mode of construction. At Antwerp, where, as here, the space was strictly limited and the regulations about building severe, the panorama was raised on substantial pillars and covered a huge building used for service purposes. Something on the Antwerp plan seemed the only possibility for us as our space was even more limited. In the end I came to the conclusion that the only available site was in shape roughly a quadrant of a circle, on the ground where the Mappin Terraces now stand. After much pondering I hit on the idea of a structure in three tiers, the highest at the circumference, a series of hills raised on lofty pillars, separated by a gallery for visitors from a second, lower tier of caves and platforms with ponds, the third with dens and ponds below ground level, and at the apex a pavilion for refreshments from which a view of the whole could be obtained. The space under the higher terraces I proposed to use for storage or any other temporary purpose until the money could be found for placing an Aquarium in it. I spoke to my friend, Mr. J. J. Joass, about the idea; he had the ground measured and worked out the details in a preliminary way, adding the steps at the sides to give access to the galleries for visitors and making some re-arrangements to leave ample room for the Aquarium. In working out the details more closely we found that there was not sufficient space to separate the hills of the upper terraces by ditches and that we must be content with railings. But Mr. Joass did more. He brought his friend, Mr. J. Newton Mappin, to see me, who agreed to pay for the construction on the lines we explained to him, up to a cost of £20,000.

I had the pleasure of reporting the gift to the next Meeting of Council, where it met with a surprising reception, partly probably from the novelty of the

idea, partly also, I suppose, because the donor did not offer to hand over the money to spend as the Council might determine, but undertook to pay the bills as they came in certified by the architect and myself, on the understanding that no deviation from the plans he had seen was made without my consent. It was suggested even that the gift should be declined, and a proposal was made that I should ask Mr. Mappin to give the money to the Council to expend on such purposes as they thought more suitable. In the end, the Council, on the strong representations of the President, who then, as always, was in favour of bold experiment, accepted the gift. The new structure was called the Mappin Terraces, which were completed and opened to the public early in 1913, unfortunately not until after the death of the donor. The Terraces and the Restaurant cost rather more than Mr. Mappin had originally contemplated, but his widow very generously supplied the funds to complete the installation.

I suppose that few persons have ever seen the completion of an elaborate scheme without wishing that they could begin it again, and the Mappin Terraces are not an exception. But the changes that might be made, if they were being re-designed to fit the same site and conditions, would not be drastic and no one of the gloomy prophecies made by objectors has been fulfilled. The animals have thriven extremely well, those on the hills succeeding beyond all expectation, As a popular spectacle they have been a great success. and especially on crowded days, the numbers of people they hold relieve the general pressure.

As 1913 was the last year before the War almost completely interrupted further progress, I reproduce a plan (Plan, 1914) showing the condition of the Gardens at the end of that period ; it shows the changes that had been made since 1903. In the South Garden the new ground acquired in 1907 had been absorbed by Goose Paddocks (No. 2), a Pond surrounded by grass for

Ducks (No. 3), the Mappin Terraces (No. 4), and the Park Paddocks. The Southern Aviary and Sea Lions' Pond (Nos. 5 and 10) had been constructed, the Wolves' and Foxes' Dens (No. 11), and the Deer and Cattle House (No. 32) had been reconstructed, the Sanatorium (No. 30) and the Prosectorium (not shown on the Plan) had been built and new laboratories arranged on the roof of the Reptile House. The Small Birds' House (No. 14), the Birds of Prey Aviaries (No. 29), and the Small Cats' House (No. 26) had been made. In the Middle Garden the chief additions were the new Offices and Library (No. 50), the Kangaroos' Paddock, the Caird Insect House, Small Mammal House and the ponds for Coypus and Beavers (Nos. 51, 52 and 53), and the Canal-bank Aviary (No. 56A). The North Garden had been opened out and connected with the Middle Garden by a new bridge and Paddocks for Cranes (No. 42), the Owls' Cages (No. 44), the Northern Pheasantry (No. 45), and the Lemur House (No. 47) had been put up. A number of new lavatories had been built and many minor improvements, such as the surfacing of the paths, the provision of garden seats and flower beds surrounding the houses and edging the lawns, had been carried out.

It was clear, however, that if further work were to be carried out, it must be on some general plan, as the space, limited at the best, was not being used to advantage. Open spaces, broad paths and a more rational alinement of the routes were essential for the convenience and safety of the increasing numbers of visitors, for the proper display of the animals and for the economic working of the Gardens. The controversy over the old Bears' Terrace had been the chief obstacle to a real advance. The terrace jutted into the central space of the South Garden, barring light and blocking circulation, but by many it was deemed a monument of antiquity which ought to be preserved. The Council called in Captain Swinton, late Chairman of the London County Council, who had had large experience in

connection with London Streets and Parks, and had been engaged in making the plans for the new City of Delhi. Captain Swinton received full information, and inspected the ground, making use of surveys and plans prepared by Mr. J. J. Joass. He was asked to prepare two sketch plans, one retaining, the other getting rid of the greater part of the old terrace. Fortunately, in the interval, it was discovered that the terrace was not the work of Burton, and this to some extent smoothed the way to the acceptance of the plan Captain Swinton himself recommended, in which only a portion of the old terrace, that which still exists, was retained. The plan included the widening of the Elephant Walk to its present dimensions, the construction of three buildings arranged in a crescent, the Central Block being what is now the Tea Pavilion, the West Block what is the new Restaurant, under construction in the present year (1929), and the East Block to be built in harmony with the West Block when it was possible to remove the old restaurant buildings. The Elephant Walk crossed the Main Walk from the South Gate towards the west end of the Gardens, with a large circle at the junction, and a new tunnel under the roadway was to be formed in the vicinity of the Main Gate.

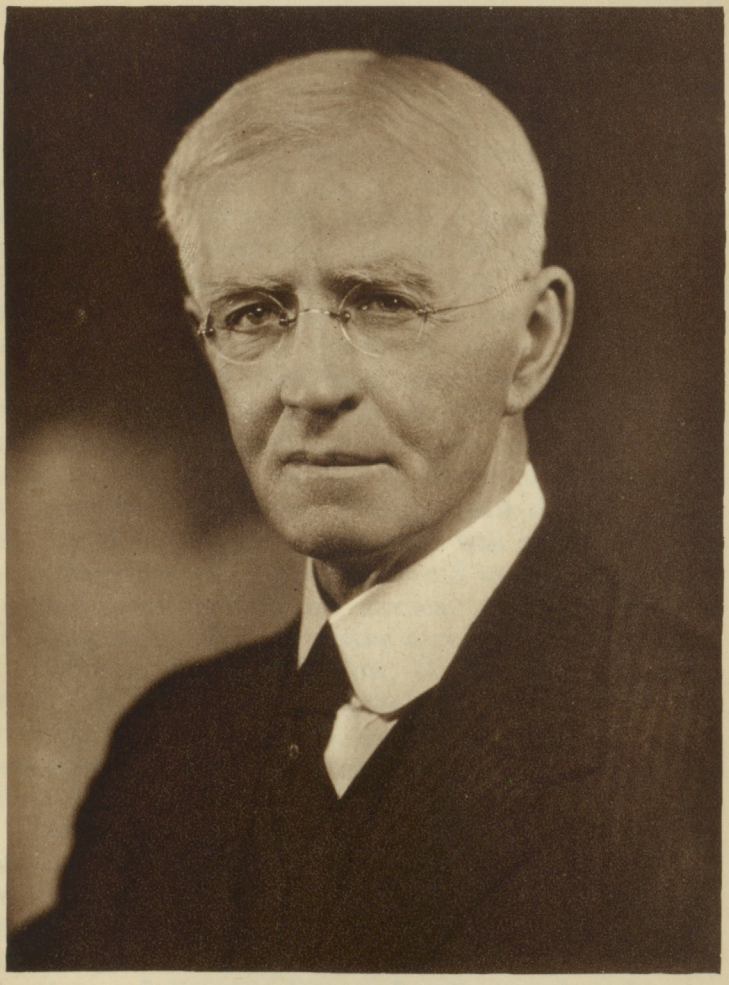
The Great War, however, arrested work at the Gardens, and when it was over, increased costs and some other considerations brought about modifications in the arranged scheme.

Chapter VII.

THE GREAT WAR AND AFTERWARDS.

The small impression left on our statistics by wars is surprising ; in the case of most of them the curves of progress (*see* Frontispiece Chart) do not indicate any extraordinary fluctuation. In the Crimean War (1854–56), there was a slight drop in 1855 ; during the Indian Mutiny there was practically no change ; in the Franco-Prussian War (1870–71) there happened to be a very slight rise ; the Boer War seems to have left no mark. In the Great War (1914–18), Fellows, visitors and receipts dropped at first, then the number of Fellows kept steady and visitors and receipts had a heavy fall. In the Report for 1915 the Council stated that, until the end of July, 1914, the Society had been extremely prosperous and that all indications pointed towards the success of the previous year being continued and increased. When the War came, the Council reviewed the whole position and decided that it " would be wise for the present to postpone all new works and to limit expenditure, so far as possible, to what might be necessary for adequate maintenance." Accordingly, no progress was made with carrying out the new plans for the Gardens, except that young trees were planted along the lines of the proposed new walks. The plans for the new Restaurant had been approved by the Council and by H.M. Commissioners for Woods and Forests, and of Works, and were ready to be put out to tender, but were postponed indefinitely. The second tunnel, near the Main Gate, similarly had to be postponed. Accordingly, in 1915, 1916, 1917 and 1918 little except work necessary for maintenance was carried on.

Arrangements were at once made to encourage any members of the staff who were of suitable age and



Hughes

P. CHALMERS MITCHELL, C.B.E., D.Sc., F.R.S.
Secretary from 1903

health to join the Forces for the duration of the War. It was agreed that their places should be kept open, and that with respect to married men, the War Office allowance to the wives and families should be made up to full pay, and with respect to unmarried men, that two-thirds of the full pay should be reserved for them. Thirty-six members of the Office staff, Keepers, Helpers, Gardeners and Works' staff had enlisted in the Army before March 1915. In March, 1916, out of a normal staff of about 150 males, including those unfitted for active service on account of age or physical defect, fifty-four had been called up or had volunteered for active service, and twenty-four had attested under the Derby scheme. Those unable to serve or who had not been called up were doing extra work, so that the Society had been able to carry on with little temporary assistance. By March, 1917, eighty-nine had volunteered or been called up, and by March, 1918, the total had reached ninety-two. During 1919 demobilisation was completed so far as our staff was concerned. Of the ninety-two who had volunteered or been called up, fourteen were rejected on medical grounds, and the following were killed on active service: H. D. Monro, W. Bodman, A. G. Whybrow, G. Patterson, William Dexter, William Perkins, Alfred L. Day and Charles W. Dare, of the Menagerie staff, A. A. Dermott, office messenger, H. G. J. Peavot, librarian, R. Jones and Albert Staniford, gardeners.

During 1919 the Council decided to place a permanent War Memorial in a prominent position in the Gardens to commemorate those members of the staff who had been killed on active service. The choice ultimately fell on a reproduction of a medieval French "Lantern of the Dead" at La Souterraine, in the Valley of the Creuse. This was constructed in Portland stone and placed where the path from the Main Gate reaches the chief east-and-west roadway in the Gardens. It consists of a hexagonal column, placed on steps, with six lights, surmounted by a conical stone roof

bearing a cross. A bronze tablet bears the names and regiments of the men. I placed under the names two lines from James Elroy Flecker's wonderful poem, "The Burial in England":—

"Till the red war gleam like a dim red rose
Lost in the garden of the Sons of Time."

The selection was thought fantastic by some, as it seemed in 1919 that the War could never become only a memory. But even now it has become only one of the wars, its brilliance and its bitter griefs, its displays of selfishness and of sacrifice only dim memories.

In 1914 the Council made special arrangements for admission to the Gardens during the War.

The families of soldiers and sailors on active service were admitted free on production of the identity certificate in the case of the Regular and Territorial Forces, and of the allotment certificate in the case of Naval ratings.

Wounded soldiers and sailors were admitted free on Sundays.

Saturdays as well as Mondays were made sixpenny days.

Tickets for British and Colonial troops or sailors, and for Belgian refugees, were issued at half price.

A good deal of trouble arose because persons in no way connected with the Society began to demand free admission on Sundays as they were going to bring soldiers or wounded soldiers with them. We found that in a great many cases the soldiers in question did not wish to be bear-led in that way, and, accordingly, the rule was made that Officers and Men in Uniform or in Hospital Uniform were allowed free admission on Sundays and also allowed to bring with them ladies or children on paying for them. This transformation of guests, often rather unwilling, into hosts, was much appreciated, and very large numbers took advantage of the privilege. We also admitted Officers and Men in Uniform or Hospital Uniform at half-price on weekdays.

Whilst troops were drilling in Regent's Park, before Canteen arrangements had been made, we provided luncheon for them in the Restaurant, admitting them without charge to the Gardens for that purpose.

Early in 1915, at the suggestion of Professor Maxwell Lefroy, Honorary Curator of Insects to the Society, an exhibition was held in the Gardens illustrating the dangers to health due to blow-flies, blue-bottles and house flies, and the methods of dealing with them. It was soon found that much further investigation was required into many problems connected with flies, and it was decided to undertake research work in addition to the exhibition. The Local Government Board, whom I consulted on the subject, and Mr. Otto Beit, made donations respectively of £90 and £50 for the purpose, and the Society bore the remainder of the cost. The Imperial College of Science and the Royal Horticultural Society joined with us in setting Professor Lefroy free from his other duties to enable him to devote his whole time to the work. The Imperial College, the Royal Horticultural Society, the Horticultural Stations at Swanley and Reading, the Military authorities, and the Cooper Research Laboratory at Watford gave valuable opportunities for carrying out practical work.

Important results were obtained respecting the treatment of stable manure and house refuse, the use of traps and baits for adult flies, and of fly sprays. The results, as they were obtained, were sent on to the War Office and to the Local Government Board.

Large numbers of the general public came to the Gardens to visit the exhibition, and special demonstrations were given to units of the R.A.M.C. and to members of civilian sanitary authorities.

In 1916, when the position of the food supply in the country was becoming difficult, the Society opened an exhibition of the modes of keeping domestic poultry on the " intensive " system, with a view to encouraging the public to take up poultry-keeping for egg production

in town gardens and back-yards. A lady demonstrator was appointed to take charge of the fowls and to give information to visitors. The exhibition was much visited ; the hens laid well and there was a ready sale of new-laid eggs to the public. In that year, also, we began to use our greenhouses for the cultivation of tomatoes, and to grow vegetables in the Gardens, most of the produce being given to hospitals. The Poultry Exhibition was repeated in 1917, and the growth of vegetables very greatly increased, even the ordinary display of bedding in the flower garden being replaced by beets, carrots and other showy kitchen garden plants. We continued to send much of the produce to hospitals and distributed the remainder to the staff. In 1918 the general stock of animals having been much reduced by using as food all those that were costly to feed and could easily be replaced in better times, and the scarcity of food in the country having become acute, the Council used all the available accommodation in the Gardens for rearing utility animals. Geese, Aylesbury and Indian runner ducks, poultry, rabbits and pigs were selected. Arrangements were made for the purchase of household refuse from the Marylebone Borough Council and from the Reform, Junior Carlton, Constitutional, United Service, Union and Athenæum Clubs, and a cooking-plant on the hay-box principle was installed. In all, 204 young pigs were bought, of which 15 died and 189 were sold at a profit, the greater number of them having reached a weight of over ten stones.

Thus, by various expedients, all of them of some public utility, the Society contrived to keep the Gardens as a going concern with our reduced staff and reduced stock of animals. Fortunately, in these difficult times, visitors to the Gardens appreciated our difficulties and were willing to take an interest even in domestic pigs and the ways of feeding them. Naturally, there were considerable difficulties in obtaining the necessary supplies of coal, and the different kinds of feeding stuffs

even for our reduced stock. The higher officials were most considerate and appreciated that we were doing our best under very unusual circumstances. But they were all overworked and it was not always possible to get in direct contact with them. The subordinates, on the other hand, often persons in a position of temporary and unaccustomed power, were often trying, until I found a way of dealing with them. From early in 1916 until the end of the War, I was attached to the Intelligence Division of the General Staff, but was allowed by my Commanding Officer to share my time between my duties as Secretary of the Society and my other duties. I used to send for civilians who were making difficulties for us at the Gardens, to the War Office, in which, having been kept waiting a sufficient time in a corridor under the cold eye of a sergeant, they became more accommodating.

The Gardens suffered no serious damage from air raids, although in this we were fortunate, as bombs were dropped repeatedly not far from us. We had taken what precautions seemed possible. I had a special staff of a few reliable men always accessible in case any dangerous animal might be released by an explosion, and the Reptile House was fitted with shutters to place in front of the glass windows of the more dangerous snakes every night. On a good many occasions I was in the Gardens during the actual progress of a raid. The unusual noise made the animals restless, and those which usually spent the night in sleep paced restlessly about. Even the most violent noises, such as those made by the defence guns placed on Primrose Hill early in the War, or by the explosions of bombs not far away, did not seem to alarm them. But when there was a rain of little stealthy noises close at hand, such as when fragments of broken shells dropped down on the roofs of their houses or in the yards alongside them, they used to fall into a panic. One night I had to take refuge under one of the concrete shelters on the steps of the Mappin Terraces from a hailstorm of fragments

of spent shell and found that the Atlas Mountain Sheep and the Caucasian Ibex on the nearest hills were in a state of panic excitement so intense that it was a marvel that they did not jump out over the barriers. In actual fact, however, the Gardens were fortunate ; no animal and no visitor came to any harm in them from gunfire, bomb or explosion. We had prepared as best we could for accidents. In 1915 we arranged a course of instruction in First Aid under the Red Cross rules. Dr. Plimmer, our Pathologist, who was a medical man, gave the necessary lectures and I gave the practical instruction. Twenty-five members of the Office and Garden staff attended and all passed the examination and obtained the First Aid Certificate. We fitted up a small room at the Sanatorium as a First Aid Station, and by occasional practice classes the men kept themselves up to the mark.

As soon as the War was over the Society which, by economy, had contrived to improve its financial position, was able to resume its ordinary course. In 1910, I had arranged, in co-operation with the Education Committee of the London County Council, a scheme for the instruction of school teachers so as to make the visits of school children to the Gardens more interesting and useful. A careful syllabus was arranged, including even the routes by which children should be taken round the Gardens. In 1910 I gave an inaugural lecture which was attended by about 300 teachers from London Elementary Schools. This was followed by one set of courses in 1910 and two in 1911, each consisting of three lectures, with lantern demonstrations, in the Meeting Room, attended by 150 teachers who were, after each lecture, given practical demonstrations in the Gardens in sets of twenty-five. The detailed courses were conducted first by Mr. J. L. Bonhote, and afterwards by other competent zoologists. They were much appreciated and the full number for each course, of which there were three annually, was quickly filled up. This system was carried on until the War, and was

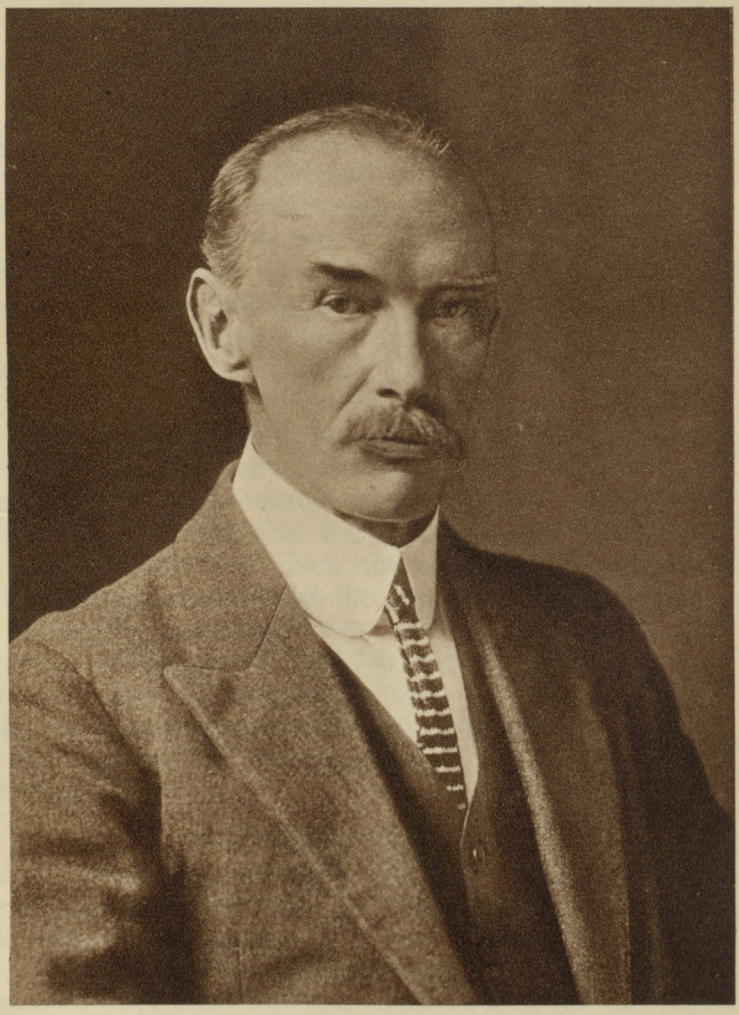
resumed in 1919 under the charge of Mr. Frank Balfour-Browne.

During the War the damage caused by rats to human health by the carriage of disease, and to human food and property by their depredations and destruction, was realised more fully than before. The Council arranged in conjunction with the Board of Agriculture and the Local Government Board, each of which made a grant towards the expenses, to hold an exhibition in the Gardens, illustrating the harm due to rats and mice, the life-history of these animals, and the known means of destroying them, and also to conduct investigations into methods of dealing with these pests. The work was placed under the immediate direction of Mr. E. G. Boulenger, then the Society's Curator of Reptiles, with the assistance of Mr. W. C. Harris, clerk in the office, both of whom had been recently demobilised. The exhibition was much appreciated by visitors, and many Sanitary Officials, and Officers in the Army and Navy, were given special demonstrations. The results of the investigations were published in the Society's *Scientific Proceedings* (1919, pp. 227–244), under the title "Report on Methods of Rat Destruction. By E. G. Boulenger, F.Z.S., Curator of Reptiles, Zoological Society of London." A large edition of reprints was rapidly exhausted and undoubtedly the exhibition and investigations were of great service to the country.

Every effort was made by the Council to begin the restoration of the buildings, enclosures and paths which had suffered by the reduction of expenditure during the War. In the earlier part of 1919, such work was limited to repairs and painting, but as the season advanced and it became clear that the receipts were leaping up, more extensive operations were put in hand. The new tunnel was begun, and, in accordance with the plans prepared in 1913, the main walks were doubled in width, the greater part of the controversial Bears' Terrace removed, the lawns increased in size, and new lavatories built.

At the end of 1913 the number of vertebrated animals in the Menagerie had been 3,973. Partly from natural losses by death, partly by the killing of animals that could be used as food, and largely because the number of additions by purchase and exchange had been reduced to a minimum, the total number of vertebrated animals at the end of 1918 had been reduced to 2,100. On the day after the Armistice was signed, we began to take steps to replenish the collection, turning first to the larger and more popular animals. The first result was a gift of sea lions most generously made to us by the Zoological Society of New York. These arrived early in 1919, and Dr. Hornaday, the Director, informed us that they were making a large collection of mammals and birds for presentation to us later. During 1919 we bought lions, a hippopotamus, and other large animals, and arranged for a collection to be sent from India, another from Singapore, and a third from the Malay Archipelago in the course of 1920.

The War had the effect of integrating the scattered countries of the British Empire, and the Society found it necessary to provide some means of honouring persons distinguished by their patronage of Zoology, and often donors to our Menagerie, who were excluded by the By-laws either from the Honorary Membership, which was limited to "subjects of the United Kingdom," or the Foreign Membership, which was limited to "Foreigners." Accordingly, an additional Chapter to the By-laws entitled "Of Imperial Fellows," was proposed in the end of 1920 and sanctioned at the General Monthly Meeting of Fellows in February, 1921. This instituted a Class of "Imperial Fellows," limited to twelve in number, who should be "zealous patrons of Zoology, of high esteem and position in India, or a British Dominion, Colony or Protectorate, but not eligible for election as Honorary or Foreign Members." Under this new By-law, the Right Hon. William Morris Hughes, late Prime Minister of Australia, General the Right Hon. Jan Christian Smuts (late Prime Minister



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R. I. Pocock, F.R.S.
Superintendent, 1903–1923

of the Union of South Africa), the Right Hon. William Lyon Mackenzie King (late Prime Minister of Canada), and His Highness the Maharaja Jam Sahib of Nawanagar were elected.

In 1921 very great progress was made in the general restoration and improvement of the Gardens, so that by the end of the year they had lost their forlorn appearance and were in better repair than at almost any previous time in the Society's history. The Menagerie had been increased to even more than its pre-war standard, and the improvements all round were attracting visitors in increasing numbers as well as bringing in more Fellows. The financial position justified taking an important step with regard to the accommodation for Refreshments. In 1888, the Refreshment Rooms had been let to Messrs. Spiers and Pond, at that time among the more prominent of refreshment contractors in London. In 1897 that firm, in return for an annual rental of £1,000, was given the sole right of catering and of selling provisions at the Gardens until December 31, 1905; in January, 1903, the firm was given an extension of the period until December 31, 1912, at the same rental, with the addition that they undertook to repay by equal annual instalments a capital expenditure by the Society for the drainage of the Refreshment premises.

As the number of visitors to the Gardens increased steadily from 1903 onwards, it had become clear that the rental was insufficient, and there were a good many criticisms, some justified, as to the catering. The Council appointed an Advisory Committee of Fellows, composed of persons who had experience of the Gardens and of catering, to enquire and advise on future arrangements. The reference to the Committee was of the widest kind. Many meetings were held, many possible contractors and other persons were interviewed, and a detailed confidential report was presented to Council. The recommendations, except for minor details, were

accepted. They were to the effect that the Society itself was to undertake the catering from January 1, 1913, with Mr. Douglas Ridley as Manager on an annual agreement, his remuneration being partly by salary and partly by a commission on the profits. It was further agreed that the existing buildings were unsuitable and could not be permanently improved, even by extensive alterations. The sketch plans of a new restaurant, prepared by Messrs. Belcher and Joass (*see* p. 236), were approved, but it was resolved that the large capital expenditure necessary should be deferred until some experience of the success of the new catering management had been gained.

It did not take long to prove that the new arrangement was profitable to the Society. Instead of the old annual rental of £1,000, the Society received in the first year the rental of £1,000, receipts from lavatories and a profit of over £2,500. There have been minor annual fluctuations, especially during the War, but the revenue from this source has risen with the rise in the number of visitors, until in 1928 it reached, in addition to the formal rental of £1,000, nearly £1,000 from lavatory receipts and £18,800 profit.

The War had postponed the construction of the new building, and in 1921 it was found that the rise in the cost of contractors' work made it impossible to proceed with the large new restaurant for which the plans had been passed, although a portion of the annual refreshment room profits had been placed each year to a re-building fund. It was decided, therefore, to proceed with the central portion of the three blocks of the 1913 scheme, and accordingly the new Tea Pavilion was sanctioned and completed early in 1922.

In 1922 the general restoration of the Gardens was continued, and the Exhibition of Collections of animals from Nepal and Indo-Malaya presented to H.R.H. the Prince of Wales during his visit to the East in 1921–22 was a great attraction. The Antelope

Paddock and the outer enclosures of the Antelope House were fitted up for the Exhibition in such a fashion that at the end of the season permanent improvements were left. Among the more notable animals in the collections which His Royal Highness very generously presented to the Society were a young orang-utan, a white-handed gibbon, four black leopards, a young elephant and rhinoceros, five argus pheasants, a large python and four cobras. The presence of the orang-utan, a young baby, and very tame, gave me an opportunity of making an experiment which I had wished to make for several years. The great apes when nearly adult, like all other monkeys, at once recognise the presence of a snake and are extremely alarmed by it. This was a fact well known from the time of Darwin onwards. It was amazing to see how the big orangs in the old Ape House, which were usually extremely sluggish, as soon as a tame snake was shown them, got up from their crouching position and hurried to the top of the cage, making low cries of alarm. But is this repulsion an instinct or an acquired habit? The new orang was too young to have acquired a knowledge of snakes on its own account and had been removed from its mother too early to have learnt by imitation. I made friends with the orang, often going in to its enclosure before visitors were about and getting it accustomed to my presence. Then one morning I took in a cinematograph operator, and when he had arranged his camera, produced a large tame snake, such as was an object of terror to the many people who dread snakes. The orang was not in the least alarmed, but took the snake as a new and attractive toy, playing with it, allowing it to coil over him, and treating it with such friendly roughness that I had to remove it.

The most important step taken by the Society, probably since its institution, was made in 1922, and led to the construction of the Aquarium. The Zoological Society of London in 1853 established what is believed to have been the first public aquarium, or

aquavivarium, as it was then called, at least in modern times, and it is a matter of just pride that its new Aquarium, opened in 1923, has been acknowledged universally to be the finest aquarium ever constructed in any country. There was a fundamental difference, apart from size and cost, between the old Fish House and the new installation. The one depended on efforts to establish a balance of life such that animals and plants might be maintained for an indefinite time in unchanged water. The other used every device of modern science to keep the water, salt or fresh, in a state, chemical and physical, closely similar to that of oceans and lakes. A handbook to the Fish House in the Society's Gardens, written by E. W. H. Holdsworth, besides describing the animals and plants that might be seen, explained the principles which inspired those who designed our first aquarium. They rested in the first place on the fact, then not generally known, that animals required a supply of oxygen which, in the case of aquatic creatures that did not come to the surface to inhale air, was obtained from the oxygen dissolved in the water. In any limited quantity of water, as in a tank or pitcher, the dissolved oxygen is rapidly absorbed by the animal life, and unless the area exposed to the air is relatively great compared with the total bulk, so that more oxygen may be absorbed from the atmosphere, the animals rapidly die of asphyxiation. To a certain extent this process can be delayed by disturbing the water and so exposing more of its surface to the external air. In small tanks frequent syringing assisted, and this method was advocated; in larger tanks the device of a forced circulation by a hand pump and a system of rubber tubing was suggested. But reliance was placed chiefly on the fact that sea weeds, green or brown, acted like ordinary terrestrial plants, absorbing carbonic acid, and, in the presence of sunlight, giving off oxygen. In consequence the art of maintaining an aquarium was to have such a balance of plants and animals that the former absorbed the carbonic acid

given off by the animals and returned to the water the oxygen the latter required. This was the theory, and on a small scale, with constant personal attention, especially to the immediate removal of all waste food and decaying matter, it served for a limited number of animals and plants. But there were many difficulties. Unless there was sufficient light, the plants died; if there was too much light the animals were unhappy and often died. Even with the utmost care the inhabitants had to be changed frequently and there were disasters due, as we now know, to the sudden growth of microscopic organisms, to rapid changes of temperature and to the disturbance of the chemical balance by defect or excess of other substances than oxygen and carbonic acid. In practice it was found that only a very limited number of species throve, these being chiefly the hardy inhabitants of shallow water. The old Fish House, however, stimulated public interest in aquatic life, and had some ephemeral successes in the study of little-known organisms. In the Council's Report for 1854, the interesting fact was stated that the first photograph of a living fish had been taken in the Society's Fish House.

A modern Aquarium is a more complicated and a more successful method for the display and study of aquatic life. In the first place, it has been discovered, contrary to expectation, that even in suitable localities close to the sea, it is not satisfactory constantly to introduce fresh supplies of sea-water. Possibly from differences in temperature, possibly from differences in chemical composition or in the contents of minute organisms, new supplies of sea-water suddenly introduced to aquarium tanks are very dangerous for their inhabitants. In our own aquarium, when marine animals are brought swiftly from the sea in tanks of water, it is found necessary to change them to the aquarium water only very gradually. Even in the case of fresh-water animals, which, as a rule, are much hardier than marine creatures, the sudden introduction of water

from an outside source is dangerous. Very large storage reservoirs, containing four or five times the bulk of the water in the actual tanks occupied by the animals and plants, are required, and this involves the provision of a pumping and circulating plant. But it also makes it possible to have marine aquaria at any distance from the sea, if an initial supply of sufficient quantity is obtained, and the loss from evaporation replaced by the careful addition of fresh water. Next, when the tanks are too large to make it possible to remove the greater part of the excreta and other waste, it is necessary to introduce a filtering plant in the circulating system, in which the impurities may be removed. The reservoirs and the filtering plants have to be duplicated, so as to make complete cleaning possible at intervals.

The balance of animal and vegetable life cannot be maintained on a large scale with any security, and so it is necessary to add to the system some means of pumping air into the tanks. In order to prevent too rapid changes of temperature, the whole building must be protected from direct sunlight, and provision must be made for warming in winter and for cooling by refrigerators in very hot weather. Finally, if the animals are to be seen by the public, the tanks must be provided with glass fronts, with suitable and artificial lighting, and with decorative rockwork. A modern aquarium is a very costly affair in construction and in upkeep.

Ever since I became Secretary of the Society, it was my ambition to have an Aquarium in the Gardens, and visits to aquaria in the United States and on the Continent confirmed my belief in the advantage and the cost of such an installation. When Mr. Boulenger joined our staff, I found that he shared my enthusiasm, and by personal visits and study of the published literature we gradually got together all the available information on the subject. When the Mappin Terraces were being designed, we were able to give the architect sufficient information of what might be required to

let him design the skeleton of the structure so as to leave room for the necessary low level reservoirs, high level tanks, circulating plant, public gallery and show rooms. Mr. Boulenger and I worked out the details of a possible installation, and, after the death of Mr. Mappin, I was able to interest the late Sir James Caird in the scheme to the extent that he asked me to have plans and specifications prepared. On his invitation, I was going to visit him in Scotland, with the architect, to explain the plans to him, a week before his sudden illness and death. Our hopes had to be put in cold storage. But in 1921 the financial prosperity of the Society, as well as the need of stimulating our success by offering new attractions to visitors, seemed to justify a bold policy. I circulated a Memorandum to Council proposing that we should construct an Aquarium, the cost of which was estimated at about £50,000. By realising our freehold property at Hanover Square we could find nearly half of that and, with the very kind assistance of our Treasurer, I had been able to arrange with the Society's bankers, of which he was a partner, for a loan up to £27,000 on the condition that the Society should redeem the loan by annual payments of £5,000 to cover principal and interest, it being understood that one or more substantial guarantors should be responsible jointly with the Society for these annual repayments. It was estimated that if a charge were made for admission to the Aquarium, the revenue would cover both repayment of the loan and the annual cost of upkeep.

The Council accepted the scheme in principle, and the President, the Duke of Bedford, with his usual generosity and encouragement of a bold policy, agreed to be one of two guarantors. The Fishmongers' Company, always ready to support good causes and naturally interested in this scheme, agreed to be the other guarantor. Although by the constitution of the Society the formal consent of the Fellows was unnecessary, it was thought proper that their opinion should be taken on an adventure which, so to speak, pledged the future

of the Society probably for some years. Accordingly, notice was given that on the Monthly Meeting to be held on May 17, 1922, the Secretary would move on behalf of the Council, "That this Meeting of Fellows approves the scheme to establish an Aquarium at the Gardens, as described in general outline by the Secretary on behalf of the Council to-day." I ascertained that there was some opposition, and a great deal of covert uneasiness about the proposal, and so I gave a careful and moderate statement of the financial side, described rather fully the beauties of a well-designed Aquarium, and insisted on the duty that laid on us not to neglect this part of Zoology. Lord Edward Gleichen, who had come to London expressly for the purpose, seconded the proposal, and Lord Grey of Fallodon supported it in a charming and convincing speech. The opposition made a poor showing, and, to my great relief, the motion was carried almost unanimously. I had a very happy evening.

Then we got to work. Under the direction of a Special Committee of Council, the plans were worked out in detail, Mr. J. J. Joass, as architect, advising on general construction and Sir Alexander Gibb on the engineering side. Valuable advice was received from Dr. E. J. Allen, Director of the Plymouth Laboratory of the British Marine Biological Association, Heer A. F. J. Portielje, Inspector of the Amsterdam Aquarium, Dr. Charles Townsend, Director of the Aquarium of the Zoological Society of New York, and many other experts. Mr. E. G. Boulenger made visits to Antwerp, Amsterdam and Berlin, to obtain information on special points. It was possible to accept tenders and to begin the operations before the end of 1922. Although we collected advice from all sides, we found that every aquarium was in most respects an experimental installation, and our own scheme followed no model. In the course of construction many unexpected difficulties arose which had to be dealt with as they turned up, and we were much indebted to Sir Alexander Gibb,

Killick & Abbot

DAVID SETH-SMITH

Curator of Birds from 1908 *and of Mammals and Birds from* 1923

Davis Bath-Brick

Cluster of Birds from 1903 and of Mammals and Birds from 1903

in particular, and to Mr. Topham Forrest, Chief Architect to the London County Council, who took a personal interest in helping us through the London Building Acts, the provisions of which covered an Aquarium only uneasily. There were a few unpleasant surprises. Almost at the last moment, a few days before the public opening, the glass of one of the largest tanks burst. We had provided duplicates of all the different sizes in case of accidents, but there was no accident to account for the catastrophe. It was an appalling thought that possibly on the opening day the Royal Visitors might be greeted with the sudden irruption of a few tons of sea-water and a shoal of gasping fish. We called a hurried conference, attended by a director of the manufacturers of the glass, Sir Alexander Gibb, Sir Herbert Jackson and Mr. G. H. Baillie, and came to the conclusion that the fault lay in the bedding. As it was impossible to take out and replace the glass in all the tanks at the time, we lowered the water level a few inches, painting out the exposed glass surface and arranged that in future as glasses had to be changed a more suitable bedding should be provided, a course which has been followed with success.

When most of the builders' work had been done, and the very complicated business of selecting and putting in the fittings began, Mr. E. G. Boulenger was engaged almost day and night in advising, selecting and supervising, and the Council, on the completion of the work, recorded their appreciation of the devotion and energy which he had given to every detail of the construction, equipment and stocking of the new Aquarium. In appointing him Director they regarded it as a special advantage that he would bring to his new duties a complete knowledge of all the details of construction and equipment. Our wisdom in making the appointment has been justified by the results. The Aquarium has been a success, both as a spectacle and technically. It has also far exceeded my financial hopes in first proposing it. From the very first it brought a large

additional revenue to the Society, directly from the charge for admission and indirectly by bringing more visitors to the Gardens. It was unnecessary to borrow from the bank as we had intended, and by the end of 1924 the entire cost was paid, and the guarantors released from their bond.

Their Majesties The King and Queen paid a private visit of inspection to the Aquarium on the morning of April 1, 1924, when they were received by the President and Council. It was opened to Fellows on Saturday, April 5, and to the public on the following Monday.

As it followed the curve of the Mappin Terraces, the Aquarium was designed as a long, rather narrow crescent and this necessity was turned into a beautiful feature, as the curving line of tanks, wholly lighted from above, made a fine set of pictures. To form a suitable background for the glowing colours of the animals in the tanks, the whole of the interior ceiling and walls were painted a glossy black and the floor covered with dark rubber. It was a new experiment in decoration and it has been successful. The whole building contains a fresh-water hall, a sea-water hall, a tropical room, large service accommodation and laboratories for research. The tanks on the north side are lighted both by daylight and by electricity ; those on the south side by electricity alone. Miss Joan B. Procter, afterwards appointed the Society's Curator of Reptiles, designed and constructed the scale models from which the rockwork in the tanks were made and actually arranged much of the rockwork herself. A secret about the opening may now be revealed. Mr. Boulenger had succeeded in getting a brilliant display of fishes and invertebrates for the tanks, and those containing fresh water were planted with suitable vegetation. But there was difficulty in getting suitable seaweeds established in time, and Miss Procter made imitations of the more common species from thin sheets of coloured rubber, with which nearly all the salt water tanks were supplied. Later on,

when real seaweeds were obtained, these were replaced, partly because they were nibbled by many of the fishes, to the advantage of neither. But before they were removed, a very distinguished zoologist congratulated the Director on the appearance of the tanks, but added, "My dear boy, these weeds of yours will never live here, you must put in faked ones."

Each of the three halls has its own system. From tanks placed at a level high above the roof of the Aquarium the water is led down by a system of pipes to the show tanks into which it is sprayed by nozzles arranged so as to take in air as well as water. The tanks have a natural overflow by which the water reaches a series of filter beds through which it passes, being robbed of its insoluble impurities, to huge underground reservoirs, which, together, contain about five-sixths of the total bulk of water in the circulating system. In these it throws down further impurities and picks up more oxygen from the air-spaces between the reservoirs and the floor of the halls. From the reservoirs it is pumped up to the high level tanks from which again it passes down by gravity to the show tanks, as I have already described. There is also a system by which air can be forced into each tank separately. The general heating is by steam and there is a refrigerating plant for use in hot weather. The pumps for raising the water and for circulating the air are electrical and are all in duplicate, and electrical fans carry out ventilation, the air in the halls for visitors being completely changed every few minutes as well as kept in movement by fans.

The sea water was brought from the Atlantic, off the mouth of the English Channel, and discharged into barges in the Thames, ultimately reaching the Gardens by the canal, from where it is pumped into the storage reservoirs. There is a certain amount of wastage which is inevitable, and the density of the water has to be watched carefully so that losses by evaporation

may be made up by the addition of fresh water. Small quantities of sea water have been brought from the Atlantic from time to time, but the system of circulation, filtration and aeration keeps it in sound condition.

Whilst the Aquarium was being built and its success was still uncertain, it was thought wise not to undertake other works on a large scale. But under the vigorous care of Dr. Vevers, the new Superintendent, a great effort was made to clean, overhaul and paint all the houses in the Gardens. A scheme was begun to cover all the main roads in the Gardens with tarmacadam, minor extensions of the accommodation in many of the houses were carried out, the Lion House was provided with additional bridges from the inner compartments to the outside cages, so as to make it easier to give all the inhabitants fresh air in turn, and the accommodation for refreshments was improved, notably by the erection of a Pavilion near the Wolves' Dens, where light refreshments could be provided at the lowest possible rates. In 1924 the same policy of general improvement was maintained, but some special works were carried out. Of these, the most important was the sinking of a bore hole 605 feet deep into the chalk in the hope of securing a supply of water sufficient for the Gardens. Notwithstanding that the best expert advice had been taken and that there is well known to be an abundant reservoir of water at that depth in the London chalk basin, the results were disappointing, and the cost of pumping per thousand gallons proved to be higher than that of a supply taken by meter from the mains. The well is being kept in commission in case of such a prolonged drought as was experienced in the year 1921. Under such circumstances we could obtain at least enough for the more pressing requirements of the Gardens.

Towards the end of the year, however, the increasing prosperity of the Gardens and the success of the

Aquarium justified a more ambitious programme. The Council arranged in the first place to build the Band Stand and Pergola, which are in front of the Tea Pavilion and form the central part of the scheme of rearrangement of that part of the Main Garden. They also considered very carefully the programme of improvements which might be carried out in the next few years and summed up their conclusions in the Annual Report for 1924, as follows :—

" In an institution like the Gardens, occupying limited space the greater part of which at any time is engaged by existing buildings, enclosures and paths, it is necessary to work out any large scheme of improvement in advance, although it may take years to complete it. This general consideration was raised by the Secretary in 1909, and after prolonged enquiry the Garden Committee and Council agreed on some general guiding principles. The most important of these were that, wherever possible, the animals should be given free access to the open air and warm sleeping boxes rather than an average temperature ; that the number of species and individuals on exhibition should be limited by the existence of accommodation suitable for them ; that the exhibits of more popular interest should be distributed as widely as possible in different parts of the Gardens ; that, for convenience of administration and for scientific interest, creatures of the same kind should be grouped together ; and that the main walks should be widened and improved so as to provide at least one great circular route round the Gardens.

" The main lines of the general scheme were explained with a plan in the Annual Report for 1913. They provided for the widening of the Elephant Walk and its continuation to the Park boundary, with a circular space where it crossed the main path from the South Gate to the Mappin Terraces, the latter path to be doubled in width and to lead to a second tunnel communicating with the Middle Garden. These

improvements have been carried out and young trees have been planted along the new alinement.

" The scheme also provided for three new buildings arranged on a raised terrace and disposed in a crescent from the site of the existing Fellows' Pavilion to the site of the existing Refreshment Rooms and intended to provide accommodation for the catering department and for animals. Plans were prepared and passed by the various authorities for the first of the three—a large refreshment pavilion with accommodation for Fellows and the public. It was intended to follow this by removing the existing refreshment rooms and erecting on the site a building with elevation similar to that of the new refreshment rooms but suitable for large animals, probably the Elephants and Camels. The third stage was the erection of a central pavilion on the site of the new Tea Pavilion.

" The War interrupted the scheme, although we were at the stage when tenders were being received. After the War, the cost of building was so high that the Council did not feel justified in expending the necessary sums on the Refreshment Department, which, however advantageous, is subordinate to the Society's main function. Accordingly, the smaller central pavilion, which was intended originally to be the last of the three, was constructed to meet immediate requirements. Since then the service department of the refreshment rooms has been much improved, a new pavilion for the provision of cheap teas has been constructed, new light refreshment bars have been constructed in several parts of the Gardens, and the Fellows' Tea Pavilion has been extended.

" The Council considered the most pressing needs of the Menagerie and decided that they related to the Apes and Monkeys, Reptiles and Batrachians, and Birds.

" *Apes and Monkeys.*—These at present are housed under bad conditions in many parts of the Gardens. There are some in the North Mammal House and the

Old Insect House in the North Garden, in the small Mammals' House and the Outdoor Cage in the Middle Garden, and in the Ape House and the Monkey House in the South Garden. This is unsatisfactory from the point of view of management and of scientific exhibition. But the accommodation is still more unsatisfactory from the point of view of hygiene. All these animals require free exposure to open air and sunlight, when there is sunlight, and to radiant artificial light in its absence, and also the opportunity of exposure to radiant heat instead of the present system of no heat or of a monotonous, relatively low temperature from a hot-water system. The ideal accommodation has to be worked out experimentally, but the general lines of it are known.

" *Reptiles and Batrachians.*—The present accommodation is unhygienic and unsatisfactory. Much of the heat is wasted on the public part of the house and dissipated through the glass roof. It is impossible to ventilate the cages sufficiently, and the service is inconvenient. The tortoises and terrapins are overcrowded, and there is no suitable open-air accommodation.

" *Birds.*—The Parrot House and the Small Birds' House are too small, have no service passages and are in bad condition. The Western Aviary is badly constructed, its back compartments are insanitary and it has long been set down for replacement. The Summer Aviary is merely a temporary makeshift. These four would be more easy to work if they were brought together.

" Even if the funds were available these requirements could be met only by a scheme which will take several years to complete, as much of the ground required is already occupied. It was decided to proceed in the following order, as funds were available :—

" *Monkey Hill and Experimental Monkey House.*—The area to the west of the Mappin Terrace has hitherto been little used by visitors and has contained only a pond with some water-fowl and paddocks for geese.

It affords an excellent site for a large rockwork enclosure giving suitable accommodation for hardy baboons and also for a small experimental house in which the newer methods for more delicate animals can be tried out before plans for a permanent Ape and Monkey House are drawn up. As soon as the success of the Aquarium showed that the Society would have a sufficient balance at the end of the year, plans were completed, tenders received and the work was put in hand in the expectation of completing it before the summer season of 1925. The Monkey Hill is a mass of artificial rockwork with a bathing pool, sheltered ledges and an interior cave and service room. It is surrounded by a deep ditch, too wide for monkeys to cross by leaping, outside which is a very wide path for visitors. The rockwork is being constructed by Messrs. Pulham from a model design made by Miss Joan B. Procter, the Society's Curator of Reptiles. It is to be occupied by a colony of fifty baboons. In the cave, to which they will have access at all times, there will be radiant heat and radiant light from quartz bulbs permeable to the ultra-violet rays which have been found useful in the treatment of sickly and consumptive children. There is also an open-air sheltered ledge with quartz-bulb electric light to give artificial sunlight in dull or foggy weather. The experimental Monkey House is a more elaborate installation, also provided with quartz bulbs, heated shelves in the open air and radiant heat internally. Mr. J. Spedan Lewis, F.Z.S., has taken a deep interest in the scientific side of the experiment which may be of great use not only for Apes and Monkeys but for other Mammals and Birds, and has generously undertaken to defray the cost of the experimental lighting and heating systems.

" *Reptiles and Batrachians.*—The second stage, which has to await the necessary large funds required, provides for Reptiles and Batrachians. There is so close a connection between the Aquarium and the Department of Reptiles and Batrachians that it would be convenient

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E. G. BOULENGER

Curator of Reptiles, 1911–1923 ; *Director of the Aquarium from* 1923

if these were close together. Reptiles, moreover, require special heating and lighting, both of which can be got from the Aquarium installation. The possibility of adapting the Anthropoid Ape House for Small Birds was carefully considered but had to be rejected. The house, which was built on the theory that Apes required protection from infection by visitors and an even temperature, is really unsuited for any living warm-blooded animals. On the other hand its semi-basement and possibly some part of its walls could be utilised in a modern Reptile House. The general lines of a new Reptile House have been worked out; a first-rate house could be constructed on the site of the Ape House and Summer Aviary, utilising one or two of the divisions of the Western Aviary, at the tunnel end, for tortoises. The construction of this is to be undertaken as soon as the way to financing it is clear. The remaining part of the Western Aviary will be added to the service accommodation.

"*Birds.*—When the Reptiles and Batrachians have been moved to the new Reptile House, the existing Reptile House can be made into a suitable House for Small Birds. The service passage already exists, and when the glass fronts are replaced by wire (which is unsuitable for Snakes) ventilation will be secured. There is good space for Aviaries attached to the house on the south and south-west sides. The site of the Tortoise House will provide for a new Parrot House.

"Ample accommodation for replacement of the Western Aviary can be found on the paddocks in front of the Lion House.

"By such re-arrangements a very large part of the Bird Collection in the Gardens will be in geographical continuity.

"*Apes and Monkeys.*—Even if all the funds were now available, the construction of a new Ape and Monkey House could not be undertaken until after the two or three years required for the parts of this scheme already

described. By that time the experimental Monkey House now being built will have been tried out, and the site of the present Small Birds' House will be free. The site occupied by the present Monkey House and the Small Bird House are reserved for the new Ape and Monkey House, and together with the Monkey Hill, will give full accommodation for as many Primates as the Society can exhibit satisfactorily."

Chapter VIII.

AIR, HEAT, LIGHT AND MONKEYS.

Before describing the action taken on the programme outlined at the close of Chapter VII, something must be said on matters of general hygiene in which the Society has been a pioneer in recent years. Long after people ceased attributing most of the ills of life to cold air and draughts in the case of human beings, they thought it only humane to protect animals imported from warmer climates by keeping them in houses kept as nearly as might be at an even temperature. Windows were kept closed, entrances provided with double doors, and hot water pipes were laid round the rooms, or embedded in the floors of cages. When the night fell, even in summer, and certainly in winter, from sundown until after dawn, mammals and birds were kept in a stagnant atmosphere. A keeper who neglected these precautions would have been thought by himself and by his superiors to have failed in his duty. From the earlier days of the Society there were some who doubted, but they were generally defeated. The original terrace for Carnivora, as designed by Burton, was not carried out because in it the animals were given access to the open air. After years of experience of the evil results of keeping lions and tigers in a stuffy "repository," a new terrace was built in which all the dens were open to the outer air. But it was hardly finished before the other school insisted on erecting glass windscreens to place close in front of the open bars, and shutters and curtains for use in winter. Much later, when the present Lion House was built, there were indeed a few open-air cages, but arranged so inconveniently that animals could be moved to them only by a single travelling cage run on rails. There was an expensive

hot-water system in the house, the usual double doors, and the least possible ventilation and light. The smaller carnivores were even more resolutely confined to warm stagnant air, odorous with their own effluvia. To-day there is no harder task than to convince keepers and those who should know better that cold air is not the first evil. Almost unconsciously those in charge of living animals, notwithstanding ascertained fact, when they report a death from tuberculosis or pneumonia, bracket with the fact, if they can do so, that the victim was in an unheated cage. From the same persons I have never yet received the report of a death accompanied by any comment on its association with absence of ventilation.

All mammals, including man, and all birds, as opposed to reptiles and still more to lower vertebrates, except when they are really ill or mere babies, have a physiological mechanism which regulates their production and discharge of heat so as to tend to keep their bodies at a nearly steady temperature, independent of that of the surrounding air. The mechanism naturally works only within a certain range ; if we were shut up in the hottest chamber of a Turkish bath, after a time we should cease to be able to lower our temperature by perspiring, and should be baked. Or, kept in a small cage in an icy wind, after a time we should fail to keep up our internal heat production and should die. In very young creatures and invalids, the range within which the mechanism can work is still narrower, and there is some evidence that in the case of persons who have had severe attacks of malaria, the range is permanently narrowed and they suffer from cold draughts which formerly would have stimulated them.

In normal creatures the heat-regulating mechanism works best when it is kept stimulated by changes in the surrounding air, and least efficiently in a monotonous environment. We all know the depressing effect of a windless day, even in the open air, and if we were

confined for life, indoors, in a room kept at what is regarded as a comfortable temperature, we should mope and sicken. And yet the latter condition was the ideal aimed at by the more advanced opinion among those who were responsible for the London Gardens thirty years ago, and it is an ideal of hygiene which still rules many minds. When I became Secretary in 1903, I was of the convinced cold air school, partly from natural disposition and partly from association with Dr. Leonard Hill, then a colleague of mine at the London Hospital Medical College, and one of the greatest pioneers in hygiene. So far as was possible, I tried to get the animals out of their stuffy conditions, and one of my first experiments, which had a good deal of success, was putting baboons in some cages without any artificial heating. In the autumn of 1903, the late Carl Hagenbeck came to make friends with the new Secretary of the Society. He was just beginning to work out his plans for the land he had acquired at Stellingen. I showed him the baboons, and, to my encouragement, found that his intention was to " refute the prevailing notion that luxurious and expensive houses, with complicated heating apparatus, were necessary for keeping wild animals alive and healthy." He " hoped to show that far better results could be obtained when they were kept in fresh air and allowed to grow accustomed to the climate." But progress was very slow ; I was an anatomist, not by training experienced in the keeping of living animals, and my theories were not accepted by those with whom I had to work. But there were some successes, and a good deal can be done in time by persistence. After a few years I hit on the idea that something might be done with a combination of artificial heat and cold air. With the kind help of Professor C. V. Boys, one of the most ingenious devisers of apparatus that has ever lived, a metal construction shaped like a three-legged stool was made. The seat was shaped so as to be comfortable for an animal to lie on, and there was a

fitting by which an umbrella-shaped cover could be added. The seat was hollow, and could be kept to any suitable temperature by a gas-heater controlled from a distance. We knew that animals would pick out a warm lair for themselves, and we hoped that, by this contrivance, animals could have all the benefits of exposure to fresh air and light and yet be kept warm. The apparatus did work, and the animals which were given an opportunity did take advantage of it. But it was regarded merely as a freak of the Secretary and soon got neglected. What happened to it I do not know.

The Society had kept records showing the date of arrival at the Gardens and the date of death of each individual mammal and bird exhibited from 1870 to 1902, in all over 20,000 individuals. I thought that some information about the duration of life in captivity as compared with what was known of the expectation of life of the different species could be obtained by a statistical examination of these records. Accordingly, with the help of my secretary, I tabulated and analysed the figures for each species. The investigation yielded a mass of interesting information, the results of the enquiry being published in the *Scientific Proceedings* of the Society (Proc. Zool. Soc., Lond., pp. 429–548). Some of the conclusions bore directly on the open-air and heat question.

The climate from which a bird or mammal comes has the smallest possible relation to its viability in captivity. This is in agreement with what Heilprin, the zoological geographer, had written in 1887, when he pointed out the error in the common belief as to climate being the chief factor regulating or controlling the geographical distribution of animals. Amongst birds and mammals regarded as tropical, the majority of species and genera have an actual or recent range into temperate or even frigid climates. Of those now limited to the tropics, still fewer are accustomed to a steady temperature. Some range periodically or occasionally to altitudes

where great cold occurs; others by exposure to the intense radiation of the dry air of plains at night, regularly endure cold going down to near freezing point, and many inhabitants of tropical forests are subjected to cold in their nocturnal wanderings on the summits of tall trees. The abundance of thick hair and fur amongst tropical mammals, and of close feathering amongst tropical birds, clearly indicates that their lives are not spent basking in tropical sunshine.

The idea that it is a fundamental necessity to protect healthy adult birds and mammals from cold is erroneous. The supreme necessity is free access to open air. In most cases this should be combined with shelter from rain and wind, and in some cases the shelter should be provided with artificial heat—perhaps often even in excess of what was then customary—but only so far as it could be arranged without any detriment to freshness of the air. Probably, I wrote, this was specially important in the case of nocturnal animals; as we were accustomed to see these asleep all day in the warmest corner given them, we were disposed to forget that at night they moved about actively often in great cold.

The most important inference from the actual records was the complete failure in practice of the theory that protection from cold by artificial heat was the fundamental requisite for mammals in captivity. In the long list of animals, belonging to nearly every group, and coming to our Gardens from nearly every part of the world, there was no case of the successful application of the method, that is to say there was no case where the maximum duration of life of any of the individuals was near what might have been expected, and the average duration of all the individuals bore no reasonable relation to the maximum. Any individual case of approach to longevity and all the cases where the average duration of the individuals was good, were animals that had been housed without artificial heat and with free access to the open air.

In the case of birds the inferences were made more difficult from another factor. The most familiar contrast in the conditions in which birds are kept in the Gardens or elsewhere is that between one or two individuals in a cage in a warmed house and considerable numbers of individuals in an aviary or enclosure giving room for exercise and access to the open air. Now, although a number of birds can be kept together, many casualties happen. A good deal of fighting and bullying takes place, and it is extremely difficult to see that every bird gets its due share of food and is not worried by its messmates. Moreover, there is the special danger of individuals which are affected with a communicable disease, or infested with parasites, contaminating their healthy neighbours. Birds in separate cages avoid these evils; they are safe from bullying, they are properly fed, and, if they are out of condition temporarily, have a better chance of recovery. But allowing for these special factors, it was equally evident from the figures that making protection from cold more important than access to fresh air had failed in practice.

I summed up as follows :—

" The most fatal type of housing for any mammal or bird is confinement in the interior of a warmed house without free access to the open air. The conditions are very complex and I do not suggest that the provision of heat is in itself an evil. The ideal throughout the period on which my statistics were based, and which still maintains an evil existence in the minds of a majority of those who have to do with living animals, is that in the first place they have to be kept warm. Warmth having been secured, the more advanced persons have consented to, or even urged, the advantage of ventilation, moistening of the air and so forth. The idea, however, is wrong. The first requisite is free access to the open air, the next is light, space and cleanliness; these things having been secured, any form

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DR. G. M. VEVERS
Superintendent from 1923

of heating that may be thought advisable may be added, *in so far as it does not in any way interfere with the primary considerations.*"

I have written at some length on this matter, even at the risk of repetition, because I think that the experience of the Society in the thirty-two years from 1870 to 1902 afforded a lesson not yet wholly learnt as to the fundamental needs of mammals and birds in captivity. The experience we have gained since, when there has been a continually increasing pressure in the direction of giving access to open air, has more than confirmed my view. It has more recently gained the strongest possible support from the wonderful researches of Dr. Leonard Hill on adults and young of the human race. He has shown that the breathing of cool air has a most important effect in keeping up the defence of the respiratory membranes against catarrhal infections and influenza. Catarrh and pneumonia are spread, not by exposure to cold, for Arctic travellers and such-like exposed to extremes of cold—hunters and open-air workers—do not suffer, but to crowding in stagnant, warm, humid, atmospheres. Experience at sanatoria shows that when bad weather confines patients within doors at the time of visitation of an influenza epidemic, more chest complications occur, than when, under such visitation, they are out of doors. All cases of pneumonia and acute fever, the wounded, and mental cases do much better when treated in open-air verandahs than in hospital wards. Exposure to the cooling power of the open air, while raising the basal metabolism, excites muscular exercise, deeper breathing, a better circulation, more active digestion and appetite, and prevents constipation. It thus promotes general good health. (*See* Leonard Hill "On the Atmospheric Conditions at the Zoological Gardens," *Proc. Zool. Soc., Lond.*, 1924, pp. 333–43.)

But although exposure to cold air is the more important part of the story it is not the whole story.

When my memoir was read at one of our scientific meetings, my friend, Professor Leiper, pointed out that the problem of the duration of life of animals in captivity is complicated by the effects of parasites. The conditions of warm, stuffy, and insanitary dens and houses are as favourable to the protection of parasites as they are unfavourable to animals. Internal parasites themselves and their eggs live longer in the droppings in a warm house, however carefully it may be cleaned, than when these droppings are exposed to the sun and light of the open air. This is certainly true of many moulds and bacteria which flourish only in the bodies of warm-blooded animals, but survive a certain time in a warmed room and are very quickly killed by exposure to cold air and to direct sunlight. It is true also of a number of the external parasites which, even if they do not kill their hosts, worry them and lower their health. It is surprising how one may handle a living warm-blooded mammal or bird, infested by parasites, and yet find that very few of them leave their host to settle on you. But if you handle an infested bird or mammal that is too recently dead for its external parasites to have perished, as soon as they appreciate the warmth of your hand they stream on to you. I have noticed with amazement a migration of vermin from the dead body of an animal towards a hot water pipe, and without doubt what they do in the mortuary they do in cages and dens.

Since 1911, Professor Leiper, and experts working under him, have done much for the identification of the parasites that are found on our animals, and, fortunately, since Dr. Vevers, himself a skilled parasitologist, has been Superintendent, it has been possible to examine the droppings and the bodies of newly arrived animals or even old inhabitants, ascertain the presence of parasites, identify them and take what remedial measures are possible in the way of cure and prevention.

Although access to open air with its stimulus of cooling winds and changes of temperature is the basal

necessity, there is no reason against, and often an advantage in, adding a supply of artificial heat. Undoubtedly the most economical way at present is by a system of circulating hot water or steam from a boiler, if the object is to keep the air in a house up to a certain comfortable level. But although cheap, the system has many disadvantages. First, it does not work well unless the ventilation is bad and the air stagnant. In the Bird House presented by Mr. Czarnikow, I introduced the system then in vogue in the most modern sanatoria. Air from the exterior was passed through a filter to remove dust and germs, heated over a furnace and then moistened with water before being passed into the house, the object being to combine a supply of warmth with a constant supply of pure fresh air Whether it was badly handled or not, I am not quite certain, but in practice it consumed much coal, the cleaning and moistening plant was always getting out of order, and the ornithologists did not like it, and before long it was replaced by the ordinary type of hot-water circulation. In the Small Mammal House, constructed with the Caird Insect House, I tried the device of giving greater heat by passing the hot water pipes close to very small sleeping boxes, and the stimulus of changes of temperature by the free choice between the hot-box, the moderate temperature of the general interior, and the warmth or chill of the open air in outside cages. This had many advantages, although it did not do away with circulating hot pipes, which are always highways for vermin and harbours for dirt and microbes. Still later, we tried the system of hot floors and hot shelves, the heat being conveyed by pipes carrying hot water or steam to a coil of pipes solidly embedded in the substance on which the animals lay. This was satisfactory so far as the harbourage of vermin went and had the advantage that it could be used in the open air as well as in interiors, allowing the animals to have warmth and cold air. But as no automatic thermostat or heat regulator could be

fitted to them, they had to be arranged so that they never reached more than a very moderate warmth.

From the point of view of the health of the animals we have found that the most satisfactory system is one in which radiant heat at a high temperature is given off, so that the beams striking the animals may warm them without raising the temperature of the air. A good fire, even on a very cold day in the open air, is a form of heating which cannot be improved on for health and comfort. Everyone who has enjoyed the hot rays of the sun high in the Alps on a clear day, when the actual temperature of the air may be well under freezing point, knows the comfort and exhilaration obtained. But open fires are not practicable for most animals, indoors or out of doors. Our next step was to imitate the Alpine effect by electric radiators placed with reflectors so that they cast beams of heat on the animals indoors or outdoors. This, without doubt, is the ideal system as it can be turned on or off as required, gives much greater heat at a higher temperature than that from any circulating system, and destroys none of the advantages of breathing cool air at the same time. It is necessary to place the electric radiators out of reach of the animals either outside their cages or by protection with wire guards. For heating we have found dully glowing radiators better than dark radiators.

When the Czarnikow House for Small Birds was built we fitted gas and arranged that during the long winter nights, when there was no daylight for more than fourteen hours, and also during foggy weather, the lights should be turned on for a short time at intervals. The object of this was to give small birds a chance of taking food and water which they will not do in the dark. Before that I had noticed that small tropical birds, if they arrived in winter or in dull weather, would bathe and preen their feathers only when under strong illumination. Light, in short, is a necessary stimulus to most animals, apart from its association with heat.

Much later, Dr. Leonard Hill and others discovered the benefits to be gained from the healing and tonic properties of the rays in sunlight now well known as the "ultra-violet" series. He showed me that a considerable proportion of these rays, and, it has since been discovered, other rays of value, are shut off when sunlight passes through ordinary window glass. He brought to me samples of a new kind of glass, now known as "vita-glass," which was being made experimentally, and which spectroscopic examination showed to be much more transparent to these rays. It seemed to be well worth trying, and I gave the first order which enabled the material to be manufactured on a commercial scale. There were some failures and some changes in the formulæ, but in time we got supplies and have used it extensively, notably in the roof lights of the Lion House, various houses for Monkeys, and in the new Reptile House, to all of which I shall refer in more detail. I may say at once, with a reserve as to the scientific value of the evidence from our experience here, that the slightly greater cost and greater brittleness are disadvantages far outweighed by the apparent gain to nearly all animals kept under conditions where they are lighted through windows. It is possible, however, that birds on the whole, gain less than other animals.

The smoky atmosphere of London, clouds and fogs, however, have already robbed the light coming from the sun of a great proportion of the ultra-violet rays it contains, so that vita-glass in windows only gave any advantage when the sun was unobscured. Dr. Leonard Hill introduced me to another source of ultra-violet rays, strong electric lights in bulbs of fused quartz. These were extremely expensive and had a rather short duration of life, but I obtained a supply of them and afterwards of others less costly but with closely similar qualities. In addition to their light rays they give out a very comfortable heat, and we found that a great many different kinds of creatures, from monkeys and

cats to lizards from tropical deserts, enjoyed them extremely. We have tried them in a number of ways. Powerful ultra-violet lights have a therapeutic value, but must be used with extreme care and kept under observation, as very little beyond the useful application may produce troublesome sores. They are definitely dangerous for young reptiles. It is doubtful if they have any great advantage, and some observations suggest even that they are disadvantageous in the case of birds. Used simply to replace sunlight in cages of healthy animals and placed so that the animals do not get too close to them, they are certainly valuable. But it is to be doubted if they have a value over that of strong electric light in ordinary bulbs at all compensating for their greater cost and the slight risk of animals subjecting themselves too long to them.

In our more recent installations for healthy animals we have used simply batteries of brilliant electric light in ordinary bulbs, with reflectors placed so as to throw the light where it is most required. And our experience seems to show that the stimulus of direct sunlight, either natural or artificial, plays a great part in the health and happiness of all mammals, birds and reptiles in captivity.

Since we began to use vita-glass, ultra-violet light and "artificial sunlight," much research has been carried out on the relation of ultra-violet light to vitamins, and there is still dispute as to whether or no the effect of ultra-violet light on animals is little more than an expensive way of supplying vitamins. Almost as soon as attention was directed to the need of these "accessory food-factors" or vitamins, I had the rations of all the animals in the Gardens tabulated and gone over by a competent expert. His report was that the ordinary food given to our animals contained a full supply of all the necessary food-factors, and that there was no need to add to the regular diet specific vitamin preparations. In addition to the ordinary rations, we still permit visitors to give food to all

except a few animals. As a help to visitors we drew up a list of substances suitable for different kinds of animals and printed this in the annual editions of the Guide to the Gardens. We had to make a special note about nuts, as these seem to be brought in larger quantities and offered to more unlikely recipients than any other materials. We had to ask that they should not be thrown into ponds for aquatic animals, or offered to any animals except monkeys, squirrels and parrots. Our suggestions for other animals were as follows: *Elephants.*—Bread, buns, biscuits, fruit, potatoes, carrots, turnips, locust beans. *Bears.*—Bread, buns, biscuits, fruit, sugar, honey, treacle, jam. *Camels, Llamas, Antelopes.*—Apples, bananas, carrots, biscuits, locust beans. *Monkeys.*—Bananas, apples, oranges, dates, grapes, raisins, currants, carrots, lettuce, nuts, biscuits, buns, sugar, mealworms. *Zebras, Asses, Deer.*—Biscuits, carrots, apples, locust beans. *Squirrels.*—Nuts, biscuits. *Parrots.*—Monkey nuts and fruit, green shoots with the bark. *Small Birds.*—Mealworms. *Tortoises.*—Lettuce, bananas, carrots. *Outdoor Lizards.*—Mealworms. No food should be offered to the large Carnivora, small cats or otters.

These suggestions were not regular rations but occasional dainties, selected partly for their suitability to the animals, and partly because they were of a kind that visitors could easily carry. Doubtless visitors still occasionally offer unsuitable or even dangerous substances, but such instances of stupidity or malice are getting rarer. On the whole, the animals gain by the excitement of being fed by visitors and the varied additions to their diet make it still more certain that they receive a full meed of vitamins. In the cases of sick animals, young animals and those that for some reason or other do not receive tribute from visitors, we add various special sources of the different vitamins. It thus happens that the dispute as to the relation between vitamin supply and ultra-violet light is outside our practical interest.

As I have already suggested, this body of experience we have gained at the Gardens in the use of cold air, different forms of heating, ultra-violet and other forms of radiation, and vitamins, although extremely useful to us and possibly to others, is not scientific experiment in the strict sense. In the first place, if accurate scientific results are required, the experiments must be made on a sufficient number of animals as nearly as possible of the same kind. Every individual differs in age, sex, condition, and so forth. In the Gardens it seldom happens that we have more than two or three examples of any species of the more important animals at the same time, each of which may differ in reaction to any factor in treatment. Our results, therefore, cannot be scientific proof. But there is a wider reason. In scientific experiments to test the effect of any mode of treatment the logical process called by John Stuart Mill the "joint method of agreement and difference," and now called the method of "controls," is adopted. Two sets of animals as nearly alike in every possible way are subjected to conditions which are identical in all but one factor. If you wish to prove the effect of ultra-violet light, you must subject two sets of the same kinds of animals to the same food, temperature, ventilation, and so forth, but to the one ultra-violet light must be added; in the other, the "control" experiment, omitted; the difference, if any, in the results, can then be set down to the one factor.

Such purely scientific experiments are outside the scope of the Zoological Society, even if we had the number of animals on which to conduct them. We have used fresh air, different methods of heating, of radiant light and of feeding concurrently wherever it seemed to the advantage of the animals, and we have therefore not the information to disentangle the effects of the individual factors with scientific accuracy. The nearest approach is to be found in the thirty years' statistics of the duration of life I examined, for there the factor of fresh air as opposed to warmed houses

Vaughan

JOAN BEAUCHAMP PROCTER
Curator of Reptiles from 1923

could be disentangled with a nearly complete accuracy. And in that case the " controls " accidentally provided by the older ideals of hygiene as compared with the newer, sufficed to prove, as fully as it is possible to prove any fact connected with living animals, that free access to open air is the fundamental necessity.

Apes and monkeys must be part of the exhibition in any menagerie which depends on popular support, and they are animals which have not thriven under the conception that protection from cold in warmed houses is necessary. Individuals certainly have lived to considerable ages, but usually these have been lethargic cripples, and the average duration of life has been extremely bad. There is no difficulty in providing them with a diet that contains every factor necessary to healthy life ; they are certain to get additional dainties from visitors in quantities sufficient to secure them a varied diet ; they are of an easy disposition, simple to amuse, very ready to take notice of visitors almost as much as if it were their duty not merely to be amused, but to amuse. No animals suffer less from confinement in the sense of moping or appearing to appear aggrieved at narrow quarters. It was decided to try to accommodate some of them under the freest possible conditions and to begin with baboons, notoriously hardy, and therefore unlikely to suffer much if the conditions given them were too severe in the London climate. They were known to live in troops and it was possible to procure a sufficient number of individuals of the Arabian or Sacred Baboon. Accordingly the Monkey Hill was designed and built during 1924–25. It is a large enclosure of artificial rockwork, a hundred feet long by sixty feet wide, enclosed in a deep ditch so as to retain the animals without bars. There are two central masses of rock with dens in the form of caves with narrow entrances, a pond, running water, abundance of shelves and ledges with overhanging projections giving shelter from wind and rain. The rockwork was constructed by Messrs. Pulham, after a model designed and made by Miss

Procter in such a way as to give the greatest opportunity for exercise. The caves contain wooden shelves and perches, and can be warmed from below by electric radiators, and lighted from above, by batteries of quartz electric globes. Some of the ledges on the outer side are also electrically warmed and provided with quartz lamps which can be turned on in very cold weather. The baboons, therefore, have free access to the open air at all times in all weathers; on their outdoor ledges and even in the caves there is no possibility of their being subjected to a stagnant evenly heated atmosphere, but, in addition to fresh air, when the weather is cold, they enjoy hot places on which to sit, and when there is no sun, they are given artificial sunlight at intervals.

Eighty baboons were put in the enclosure in early spring, 1925. From the first they came out in all weathers, but retired to their caves at night. They quickly discovered the warmed outdoor ledges and took advantage of them. Since then there have been cold and damp summers and some extremely severe winter weather. The apes have never been shut away from the cold, and have constantly come out in snow and frost. The colony has thriven extremely well. As was inevitable in so large a number, containing creatures of different ages and different constitutions, there have been some deaths, but none that could be attributed to exposure. The general health and appearance have been excellent, far better than under the older conditions. On the advice of persons of experience we intended to stock the enclosure at first only with males, but a few females came with the others. Later on it was decided to make the conditions more natural by introducing a number of females. When this was done there was a battle royal; the males already in possession of wives (the species is nearly monogamous although living in troops) deserted their mates, and there was a terrific battle for the new females in which there were many wounded and some casualties. After a few days,

however, all was peace again, and although from time to time a quarrel has arisen, it has generally been short and not serious. On the whole, these baboons live a harmonious communal life, recognising rights to particular ledges, caves or females, posting sentinels and guarding their young. Apart from occasional sexual disputes, and these are extremely rare except when new individuals are introduced, there is far less bullying than in an open-air assemblage of macaque monkeys, in which there was always one bully, which, when it had become so savage and dominating as to be removed, was almost at once replaced by the next in size.

So far as health goes, the Monkey Hill has been completely successful. But it has raised another problem to which different persons give conflicting answers. When healthy adult animals of the two sexes are kept in the same cages or enclosures, courtship and sexual union occur. It is sometimes possible to seclude animals from the public during their breeding season; in other cases this is impossible, as, for example, with apes and monkeys, whether they are in a large exclosure or confined in small cages. Some think these natural phenomena demoralising, if it is possible to see them; others insist that it is outrageous to take such a view. My own impression is that we of the older generation are more easily shocked in the presence of what younger people accept unemotionally.

The Monkey Hill, even if it were successful, could not serve as the model for a replacement of the Monkey House and Anthropoid Apes' House, for which a very large building to accommodate individuals representing many different species was necessary. A new Monkey House must cost a very large sum of money and must serve its purpose for a number of years. We wished it to be provided with open-air accommodation for every internal cage, to be hygienic in every sense of the word, to give ample and convenient service accommodation

and to be suitable for the comfort of visitors as well as of the apes and monkeys. As usual, moreover, these conditions had to be met on a site of limited size, that is to say that of the existing Monkey House, with some wasted space behind it.

We decided, therefore, to make an experiment over a period of two or three years on a small scale, so as to secure by trial an installation as perfect as possible in every detail for the housing of any of the Primates, from anthropoid apes to the most delicate marmosets. A full-sized model was set up, representing three sections of the Ape and Monkey House we proposed to build. It consisted of an inside and outside set of compartments with a service passage between them, large sliding doors giving access from the passage to the outdoor enclosures and the indoor compartments for cleaning and for putting in or taking out monkeys, bedding and food. The inner compartment had a shelf half way up, above which there was an aperture to the exterior, provided with a hinged swinging flap arranged so that the apes or monkeys could go in or out exactly as they pleased at all times. The open-air compartments had a covered verandah, as well as a part roofed only with wire netting. There was space inside and outside for the usual swings, climbing ropes and other facilities for exercise. Special precautions were taken to prevent the existence of corners or dark places where vermin could lurk, or dirt accumulate. All the surfaces with which the animals came in contact were of some impermeable material, glazed bricks, special cement or asphalte, and, just as the whole building could be swept by any winds that blew, so floor and walls could be cleaned with water and disinfectant. As there was no hot-water circulating system, there were no stacks of large pipes behind which it would be impossible to secure adequate cleanliness. The roof lights were ample and were of vita-glass so that the sunlight passed through them unrobbed of the ultra-violet series of rays. The shelves and portions of the floors inside and outside were

kept at a pleasant temperature by coils of steam pipes embedded in them. Inside and outside there were batteries of quartz electric globes to give artificial sunlight.

A small orang-utan, some African monkeys and a number of delicate marmosets from tropical South America were placed in the new house and kept under careful observation. The doors of the passage through the house for visitors were kept open in all but extremely cold weather; the louvres in the roof were always admitting air, and the monkeys themselves, going in and out by their own swing doors, added further to the efficiency of the ventilation. The results were admirable, and, after the first winter, it was already clear that the combination of cold fresh air, warmed shelves and radiant light and heat provided the most suitable conditions for most kinds of apes and monkeys even in the treacherous London climate.

It was fortunate that the model on which it was proposed to build a new Monkey House had turned out successful, because a sudden outbreak of tuberculosis in the existing Monkey House made a change in the order of the Garden improvement scheme necessary. One or two monkeys which had turned out to be tuberculous unfortunately were put in the old Monkey House before the danger was realised. Under the conditions of warmed stagnant air and absence of access to outdoor cages, the contagion spread, and so serious did the position become that it was decided to demolish the old Monkey House, and proceed at once with the construction of two-thirds of the future Monkey House. Plans were prepared by Mr. E. Guy Dawber exactly on the lines of the experimental house, with the general instruction that the building was to be as simple as possible, even at some detriment to the external appearance, all the available money being allotted to practical requirements. The work was begun in the autumn of 1926 and the new house was opened at the end of 1927.

Every section has an inner compartment in which the monkeys are visible to visitors inside the house, an aperture with a swing flap which can be opened or shut by the monkeys themselves, leading to the outside enclosures. The service passages run between the inner and outer compartments and, as in the experimental building, have large doors with sliding shutters giving access for cleaning. The ventilation is of the freest kind, there is no hot-water circulation, but warmed shelves and batteries of "artificial sunlight." The only difference is that the expensive quartz globes have been replaced by ordinary bulbs, with a very large saving in initial cost and maintenance. It is to be doubted, however, if the replacement is quite efficient; in a spell of really cold weather we found it advisable to add some electric heat radiators, a provision that would have been unnecessary with the quartz globes, the light from which, whatsoever its exact physical properties may be, is in practice more comforting.

It happened that the house was ready for occupation in the depth of winter and that a very severe "blizzard" occurred almost immediately after the monkeys were moved in. The temperature of the air inside the house fell down to below freezing point, as indeed there had been no intention of preventing. A cold draught and occasionally a few flakes of snow came in through the louvres in the roof. The monkeys, accustomed to the old conditions, did not at once find out the warmed parts of the shelves or the advantage of sitting under the electric lights, and some even, being clumsy in getting through their swing doors, bruised their tails. There was almost a panic amongst those who were in direct charge, and, such is the strength of old conceptions, that I doubt not but that every aperture would have been sealed, oil stoves would have been introduced and the exact conditions the house was designed to avoid would have been restored. Fortunately Dr. Leonard Hill was good enough to come

hurriedly, examine the conditions and allay some of the worst fears. As a compromise we agreed to put movable canvas frames over the louvres so as to stop the violence of the draughts; the monkeys learned to sit in the warmer places and to avoid pinching their tails, and the new arrangement is an admitted success. What awaits the future is the completion of the last quarter of the house, with sections on a much larger scale suitable for anthropoid apes. If it comes in my time I shall hope for no other alteration than a return, even at the greater cost, to lights supplying some form of radiation including the ultra-violet rays.

Experience has shown that even under bad conditions, gibbons, if they have room for exercise, chimpanzees, orang-utans and even gorillas may live for considerable times in this climate. So far as is known, gibbons and orang-utans, being the most characteristically arboreal of the Great Apes, would require larger indoor exercising ground and would not use outdoor enclosures to the same extent except in summer weather. But it is known that chimpanzees and, still more, gorillas range in their native haunts to high levels where the temperature rises and falls rapidly and where not only heat but severe cold is encountered. I do not doubt but that if they could bask from time to time under the rays from powerful "artificial sunlight" lamps, preferably those transmitting ultra-violet rays, they would thrive all the better for constant access at their own will to the open air in all weathers. But, so far as our experience goes, a further distinction has to be made. Gibbons are independent creatures, which although they may take fancies to individuals, do not seem to depend in any marked way on the human companionship to which they have become accustomed. Chimpanzees are capable of marked affection and will show it noisily to their friends, welcoming their arrival with gesticulations and excited cries. But the affection, although demonstrative, is not deep-seated. They will

thrive under the care of anyone who is good to them and show no signs of moping for absent friends.

Orang-utans and gorillas have a different character. Without doubt they mope, sulk and pine with strangers, or in strange surroundings. This is very highly marked in the case of gorillas, which have mental qualities more closely resembling those of mankind than are possessed by any other animals. Our experience, which, even in the last thirty years, covers a considerable number of individuals, shows that it would be useless to expect orangs or gorillas, captured when they were adult or nearly adult, to thrive in this country even were they given the best conditions. If, however, they have been taken when young enough to transfer the affection they would show naturally to their mother to a human companion, and if they are transferred from that person only by degrees to the care of a keeper whom they like, they may be expected to succeed if also they are given suitable physical environment.

Ipswich Museum

JOHN GOULD, F.R.S.

Chapter IX.

ELECTRICITY AND THE REPTILE HOUSE.

The introduction of electricity to the Gardens has made possible some of the greatest improvements the Society had carried out in recent years, and I do not doubt but that, as our second century passes, it will lead to still greater advantages. It is the only form of artificial light which can be used with safety and without detriment to the air and yet provide the stimulus required by all creatures in the absence of sunlight. As a supply of power, it makes possible ventilating fans wherever they are required, and can be used as we now use it to some extent for pumping, for circulating water and air through conduits and for various appliances in our workshops. As a source of heat it is admitted to be theoretically wasteful to transform coal or oil into electric current and then to re-transform the latter into heat. But it seldom happens that the cheapest method is the best, and in weighing the relative cost of heat units supplied from current and supplied from a circulating plant where water is heated or turned into steam by oil or gas or coal, other considerations have to be taken into account. Of these the most important to a zoological garden are the ease of taking an electric wire to the exact point at which heat is to be liberated, the convenience and safety of being able to apply the heat or turn if off almostly instantaneously, and the possibility of a much more exact adjustment and maintenance of the temperature at any point required than can be obtained by other methods. There is also the minor advantage that, as menageries require most of their heating at night, they are taking current from the stations away from the " peak " load and so can generally get a cheaper rate.

The first electric cable which entered the Gardens was merely to give a domestic supply to the Offices and Library. The supply came from the Borough of St. Pancras in which that part of the Gardens is situated. Soon after the Caird Insect House was built we ran an extension to it from the Offices and it was in that house that electricity was used first for lighting any of our exhibition cages or for supplying accessory heat to any of the animals. When the Aquarium was being designed a more extensive use of current was required and the Borough of St. Marylebone ran in a cable for us. From the aquarium cable we carried an overhead wire to the old Reptile House, where Miss Procter, the Curator, was engaged in a desperate struggle to persuade iguanas to feed and to live through an English winter—results which she obtained for the first time, at least in our history, by putting them on trees in a large glass house and giving them radiation from quartz electric bulbs. Later on, St. Marylebone laid an extension cable along the South Garden to the Reptile House, and, still later, laid a new main and equipped a transforming station from which we now have sufficient current to supply the whole needs of the Gardens for many years. The Society owes a debt of gratitude to the electrical authorities of the borough for their enterprise and foresight, as well as for the relatively low rate at which they supply us.

The laying of the cable made it possible for us to equip the new Monkey House on lines which could not have been carried out by any other means and has also made it possible to instal electric cooking plant in the new restaurant on a scale which is almost unique. But it also enabled us to construct the new Reptile House.

I propose to tell the story of the new Reptile House at some length, partly because it is by far the most novel installation for the accommodation of animals that has yet been made in any country, and partly

because it may interest persons who see our installations only from the side of visitors, to know how much technical equipment lies behind attractive show cages.

The Society owes its unique Aquarium in large measure to the knowledge, perseverance and enthusiasm of one person, Mr. E. G. Boulenger, now its Director, and we owe at least in the same degree our unique Reptile House to Miss Joan B. Procter, our Curator of Reptiles. Mr. Boulenger had the advantage that there were in existence many competently designed aquaria; he was supplied with the best architectural and engineering assistance we could obtain; many experts gave their advice, and throughout the construction and equipment, Dr. Vevers' shrewd and practical judgment and all the help that I could give were at his disposal. But a complicated job is not carried to a successful issue unless there is a competent principal and Mr. Boulenger was the principal. Miss Procter was in some respects less fortunate, as there were fewer models to study. Mr. Boulenger and I were able to give her full information about the arrangements in the great combined Aquarium, Reptile House and Insectarium in Berlin, and with negative hints of what to avoid from our knowledge of other houses for reptiles—hints which she was able to amplify from her experience in our own old Reptile House—in many respects the worst that was ever built. She also had the best possible architectural and technical advice and we all assisted her in every way we could. But from the beginning to the end it was her house.

As soon as I knew that it was possible to have a new Reptile House I gave Miss Procter a ground plan of the available site and asked her to arrange if she could that the accommodation for visitors should be through a continuous gallery or passage to allow of free circulation on crowded days, and that the show cages should be illuminated on the Aquarium principle, the spectators being relatively in the dark looking from a shaded

passage on the illuminated reptiles. Here I may say that an unexpected difficulty turned up in the application of this principle. In an aquarium tank the water, with its level raised above the top of the front glass, shuts off from view the windows or other sources of illumination. In a cage without water, this convenience is absent and a very exact relation of the height of the aperture of the cages to the height of the background is required. We thought we had worked out this, but to make sure we had a full scale model in wood and canvas set up, and found that the calculated proportions required correction. The model was also used to test the resistance of painted backgrounds to the weather and to cleaning materials, as well as for trial of actual designs and methods of decoration.

Miss Procter answered my requirements and, at the same time, several of her own, by a simple and novel ground-plan. The centre of the building was occupied by an island block of show compartments enclosing a service hall. Round this ran the public passage continuous from the entrance hall until it returned again to it. The glass fronts of the cages, which were permanently sealed, gave on the public passage. Round the outer side of the public passage were placed similar sets of show cages, similarly sealed, and with an ample service passage between them and the external walls. The roof of the passage was opaque, and all the light fell on the cages from above and behind the scenes. In deference, at first rather reluctant, to my conception of a decorative scheme, the walls, floors, and spaces between the windows of the cages were painted black, to form a frame which would set off the colours of the lighted cages.

Many reptiles are dangerous, either because they are large and powerful, like the constrictors, or because they are venomous. The cages round the island block were arranged for all these dangerous creatures, and the doors into their dens opened from the central space,

so that in case of accident any escapes would be into the service space and not into the part of the building occupied by the public. This central space also served as a receiving and unpacking room in which cases containing newly-arrived reptiles could be opened, their contents identified, washed, given preliminary treatment, such as having their mouths cleaned, sores dressed, ticks removed, before being taken either to the sanatorium or laboratory for further observation and treatment or being put into their permanent homes. The unpacking of reptiles is an exciting and dangerous business even for experts, and in the old House it usually had to take place in an open yard from which reptiles might easily escape. In the new House the service space was arranged so that when the doors were closed, even a reptile that was not caught as soon as the case was opened, could find no inaccessible lurking-place. Possibly more often than not, reptiles on their first arrival are sluggish from cold, and, when the case is prised open with a lever, they lurk in the bottom until they can be identified, if sufficiently large and distinct, and picked up as need may be, by the hand or by wooden tongs, or a leather slip noose. But there is no knowing ; almost before the lid is off, a quick and venomous head may dart out, and, to make a mistake may lead to death. Nor is it ever safe to trust to the labels, either for numbers or for identification. Often the consigners make mistakes, including a venomous snake with harmless creatures, or giving a wrong number of individuals. Some of the most poisonous snakes are viviparous, and it has happened more than once that a box alleged to contain a single snake is swarming with active little creatures, no thicker than earthworms, that have been born on the voyage, and that are almost as dangerous as their mother. The central service space was one of the most ingenious and useful parts of the design. The dens for the larger snakes surrounding it were supplied with sliding doors, each with a small inspection window so that the position of

the inhabitant could be noted before the door was opened for cleaning or feeding. These large dens were also provided with roll shutters which could be let down by a winch, shutting off one part of the interior if it were necessary for the keeper to have access. The dens for the venomous snakes were arranged with their doors very high up, access to them being gained by a light gallery. They also had inspection windows, and as an additional precaution, light slides of wire gauze which could rapidly be drawn over the aperture, when the door was open.

From the central space a wide and straight staircase was to ascend to the roof level on which at each end there was to be a second story providing a laboratory and infirmary, a Curator's study, a typist's room, a room for spirit specimens, and an insect-breeding room, and on the flats over the public passages, abundant space for larders, open-air reserve tanks and the various ventilating shafts, water tanks, and so forth, that would be necessary for the service.

The cages round the outer side of the public space were to be of different sizes for different kinds of creatures and were to include well-lighted large enclosures to be filled with plants and rockwork, a crocodile beach, and a small cool hall for amphibians. In a semi-basement, part of which was already in existence, provision was made for dressing rooms and a mess room for the keepers, store rooms for reserve cages, an electrical room, and a room for a small boiler to supply hot water.

The numbers, sizes and dispositions of every cage were worked out down to essential, but often neglected, details in design such as the provision for cleaning and draining each cage, of communicating doors between adjoining cages when it might be necessary to shift a dangerous creature from one cage to the adjoining one, the guarding of ventilating and drainage apertures so as to prevent the exit of snakes.

When the draft plans were complete and had been examined and approved in detail by the Garden Committee, they were handed over to Mr. E. Guy Dawber (now A.R.A.), who translated them most competently into the technical language of architecture and designed the simple and beautiful elevation of the house. Mr. Dawber arranged to relieve the severity of the entrance door by a narrow band of carving on each stone door post and across the lintel. The work was carried out by Mr. Alexander, a well-known decorative sculptor, who at once entered into the spirit of Miss Procter's meticulous desire for scientific accuracy as well as artistic beauty, and modelled every amphibian and reptile represented in the carving from living creatures in such a way that even their specific characters are reproduced.

So far, the designing of the Reptile House was only an unusually complicated piece of work in the course of which little more than the familiar need of co-operation between client and architect to overcome technical difficulties was required. There were more formidable obstacles to be overcome. We all wished that the various cages should present as beautiful and as natural pictures as the aquarium tanks in the decoration of which Mr. Boulenger and Miss Procter had been extremely successful. In some cases this was relatively easy. The large enclosures at the south end of the house arranged for iguanas and other big lizards, such as the Komodo dragons, could be filled with rockwork, pools and tropical plants in such a way that the pictorial aspect could be adapted to the comfort of the reptiles and the possibility of cleaning. The smaller cages could be treated in the same way. So far all that was required was knowledge of the habits of the reptiles, the selection of suitable plants, provision for concealing tubs, and arrangements for the periodical removal and disinfection of gravel. With time, patience and artistic skill all these enclosures were turned into beautiful and practical scenic effects. Enclosures

adapted for aquatic reptiles and amphibia were equally straightforward and were dealt with on familiar lines.

But many reptiles are dangerous, and all of them are insanitary in their habits and liable to contagious and infective diseases. From the practical point of view the most suitable provision for them would have been bare walls of glass or smoothed concrete, arranged in severe flat surfaces, and simple bathing tanks. How could such hygienic conditions be combined with some decorative effect? Miss Procter devised the plan of keeping the compartments obviously artificial but of presenting them as having windows or balconies looking out on natural scenery, appropriate to the localities from which the reptiles came. After enquiry and the consideration of suggestions from many sides, I came to the conclusion that the kind of enamel paints used on modern motor cars might be suitable, as they were prepared to resist rather violent changes of temperature and to endure rain and moisture and rough cleaning. Messrs. Hadfields, of Merton, took an interest in our requirements and made many experiments for us until they were able to suggest a treatment of cement surfaces which would take enamel paints. Mr. John Bull, the scenic artist, who had assisted us with practical problems of a similar kind before, found by experiment that he could get the necessary pictorial effects with the possible range of enamels. Miss Procter gave the subject for each cage, and by the kind help of the late Mr. Daydon Jackson, we got illustrations of the appropriate palms, and other tropical or semi-tropical plants, appropriate to the scenes and countries we had selected. Mr. Bull and his assistants got to work as soon as the cages were ready and a unique result was obtained. Notwithstanding all our care, some chipping and flaking of the scenic painting has taken place, due partly to "sweating" from the concrete through the protective dressings of its surface, and partly to dripping of condensation water. But both these defects are being overcome and the treatment has stood up well to the hard usage it

Hughes

F. Martin Duncan
Librarian from 1919

has to receive. It may be regarded as a decorative and practical success.

Still more important were the problems of heating. Reptiles, if they are to be kept in health and activity, for the most part require high temperatures, which, however, must vary in different cages and be kept steady within a very narrow range. For the comfort of visitors, and for the health of the attendants, these high temperatures must be confined as far as possible to the cages occupied by the animals themselves. I was convinced from the first that an electrical system was the only practical means for accomplishing these ends. There was much difference of opinion among my colleagues on the staff and on the Committee, and we decided to have alternative schemes prepared. A consulting engineer with special knowledge of heating systems had all the requirements and conditions put before him, and produced in due course a scheme of extreme ingenuity based on a hot-water circulation. I asked my friend, the Director of the National Physical Laboratory, to suggest an electrical manufacturing firm who might be likely to devise a scheme which would require far more research than its magnitude would justify on purely commercial lines. After getting his suggestions, I happened to go first to the General Electric Company, who at once agreed to put the experts of their magnificent research laboratories at Wembley on the task. Dr. C. C. Paterson, the Director, and his staff, as soon as they knew the technical difficulties to be faced, became enthusiastic and in due course prepared a scheme. After much consideration, the Committee decided in favour of the electrical scheme. I take pleasure in recording our tribute to the enterprise of the General Electric Company, both on its business and its scientific sides, for the enormous labour and skill they devoted to carrying out the scheme. It is the more gratifying that it has proved successful in every respect and that it required the invention and construction of much delicate apparatus

of a kind for which there can be no commercial prospect. The Company "made a hobby" of it.

The complexity of the plant is amazing. The installation has approximately twenty miles of electric cable for the heating system and twelve miles for the indicators and "tell-tales" used in its regulation. Some of the compartments have as many as two hundred electrical connections. The lighting installation is almost equally elaborate.

Two types of applying the electric heat are employed. The cages have sets of radiators at a glowing heat emitting beams which are directed by reflectors in pools of warmth on particular parts of the rocks or floors, arranged so as to attract the reptiles to bask in places where they may be in view of the public. Radiant light from other reflectors is focussed on the same spots so that the combination gives not only the light but the warmth of the sun. To visitors it may seem that the reptiles often pose deliberately in places where they can be seen, but the deliberation is selfish and not actuated by any consideration for the public. As the temperature inside the cages is usually much higher than that of the public passages, there is a tendency for precipitation of moisture which obscures the vision. After trying various expedients to prevent this inconvenience, we adopted the suggestion of the electricians, and had other heat rays directed to the inside of the glass, an arrangement which reduces the condensation of moisture to a minimum.

The heating of the cages is carried out by sets of black radiators fitted into water-tight cast-iron boxes embedded in the partition walls forming a panel type of heating, in the floors, in selected parts of the rockwork, and actually in the pools. These are all placed so that the boxes are accessible and the heating elements can be removed, examined, and replaced or exchanged, from the service passages, without disturbing the

animals. The boxes are of different shapes, some flattened and of large area, others tubular.

The temperature in each cage can be controlled by an adjustable electric thermostat which can be set by a screw to any temperature that is required. As the temperature rises, the current is shut off; as it falls it is turned on, with the result that there is a variation of less than a degree and there is no waste of current as only so much is used as is required to provide the necessary additional heat. Accidents, however, might happen by the "contactors" failing to work, or by a heating element breaking down or a fuse blowing. These are provided for by an alarm system on a separate circuit by which a bell rings in the electrician's and the head keeper's rooms and a red light appears against the number of the heater if the temperature is rising above the danger line, a green light if it is falling.

Light is almost as important for reptiles as heat. All the roof lights, the windows of the laboratory, and the backs of the small movable cages are of vita-glass. In addition, every cage and compartment is fitted with electric light in some form, because English sunlight is very rarely sufficiently intense to give reptiles the stimulation they require for feeding. The reptiles are therefore given artificial sunlight for some hours every day, except on a very few days in brilliant weather. For most reptiles powerful electric light of the ordinary kinds is sufficient, but young ones and special cases, like desert-living lizards and iguanas, do better with ultra-violet globes. Ultra-violet light is also used with great precaution as a curative agent; when it was first used it was found that too long exposure to it seemed to accelerate the heart to a dangerous or even fatal degree.

Ventilation of the cages, which was practically absent in the old house, is secured by a forced system. Powerful fans in the roof suck out the air by a set of conduits with branches from each cage, and inlets supply

fresh air already slightly warmed from the service passages.

The large laboratory on the upper floor has one end fitted like a surgical laboratory, with all the appliances for doing minor operations, mouth dressings, the removal of decaying teeth, or of the skin covering the eyes which not infrequently fails to come off when a snake casts its skin, rendering it practically blind. There is similar provision on the most modern lines for applying dressings. The remainder of the laboratory is used for rearing young reptiles or for keeping new arrivals or delicate creatures that have to be hand-fed. The cages for these are of vita-glass, and quartz lights on a running attachment along one side of the laboratory can be applied to any of the cages.

The Reptile House was opened to Fellows and visitors on June 15, 1927, and has continued to be one of the chief attractions in the Gardens. Its technical success has more than justified the care expended on its design and equipment. But there is always a crumpled rose-leaf. Under the new conditions the reptiles are more active, feed better, and grow more quickly. When a number are kept together, as for example on the Crocodile Beach, or in the compartments adapted for young crocodiles and alligators, the excellent physical condition and high spirits of the animals have led to severe fighting with the necessity of subdividing some of the larger enclosures and segregating bullies. On the other hand, the better conditions for the reptiles themselves and for the feeding and handling of them has made some unexpected creatures docile. Notable instances are the Komodo dragons, which are as tame as dogs and even seem to show affection. Even more noteworthy is the docility of some of the large pythons, creatures usually dangerous to handle because of their strength, constricting powers and severe, although not venomous, bite. Some of these, when the door from the service compartment into the cage is opened, will

allow their heads to be stroked and their mouths examined.

To complete the arrangements for reptiles, two other installations were added. Near the Main Gate a Reptile Rock Garden has been made on the principle of the adders' enclosure, near the old Reptile House. It is surrounded by a deep ditch of concrete with running water which serves as a moat and with the outer wall smoothed and provided with a curved overhanging summit preventing the reptiles from escaping. The enclosure is arranged with rockwork of natural water-worn limestone and is planted with suitable vegetation. There is a pond for terrapins with a deep layer of mud in which they can hibernate, and the rockwork is arranged with ledges, small caves, and pits of leaf-mould suitable for lizards, adders, grass snakes and other reptiles from the North Temperate zone. Even although it was completed rather late in the autumn, the lizards and snakes came out daily when there was sun, and only retreated to the hibernating places provided for them when winter had actually begun.

There was no suitable accommodation in the new Reptile House for the giant land tortoises, which are one of the scientific treasures and popular attractions of the Society's collection. These creatures require large enclosures, both indoors and outdoors, as, when kept in suitable conditions, they move about actively and also because their odour is unpleasant to many persons. Towards the end of 1927 the Czarnikow Small Bird House was set free when the old Reptile House was equipped for birds, and its interior was re-arranged, provided with large enclosures for the tortoises communicating with out-door paddocks, and a set of aquarium tanks for the terrapins. The latter have to be provided with glass fronts, as it seems that small terrapins, like coloured labels, present an irresistible attraction to dishonest people, and were frequently stolen from their old quarters. The house has retained

its hot-water circulating plant, but batteries of strong electric bulbs have been added, and these, without doubt, have been a great advantage to the tortoises. Several of the giant tortoises have learned to beg food from visitors and take buns, bananas, carrots and brightly coloured flowers.

Something, I think, should be said about a question on which those responsible for zoological gardens are frequently attacked with inhumane virulence by persons and Societies animated, I do not doubt, by a genuine dislike of all forms of cruelty. So far as I know, all serpents living in a state of nature feed entirely on living prey. Some lie in wait for their victims, coiled on the ground, or on the branch of a tree, ready to strike at any moment, the head and upper part of the body being shot out at the moving prey with such rapidity and strength as to reach the victim at a distance of more than half the length of the snake. Others seem to leap up in the air at their prey. Many snakes pursue their victims through water or along the ground, moving very rapidly. I have watched grass snakes on a hot afternoon swimming over the surface of a shallow pool, twisting and darting among the water weeds like miniature torpedo boats in quest of frogs which from time to time thrust the tip of their snouts through the surface scum to breathe. When they sighted a frog they would pursue it through the water and even on to the land.

The prey varies according to the snake, from earthworms and small grubs to fish, frogs and toads, lizards, other serpents, birds and mammals. When poisonous snakes have struck, inserting their fangs, they almost invariably let go at once and seem to wait and watch until the victim is dead. Other snakes, especially the constrictors, strike a heavy blow, fix their teeth in the prey, knocking it over at the same time, and then throw their coils over it, holding it fast, sometimes crushing it by their mere weight, sometimes actually squeezing it in their coils. The non-venomous snakes that do not

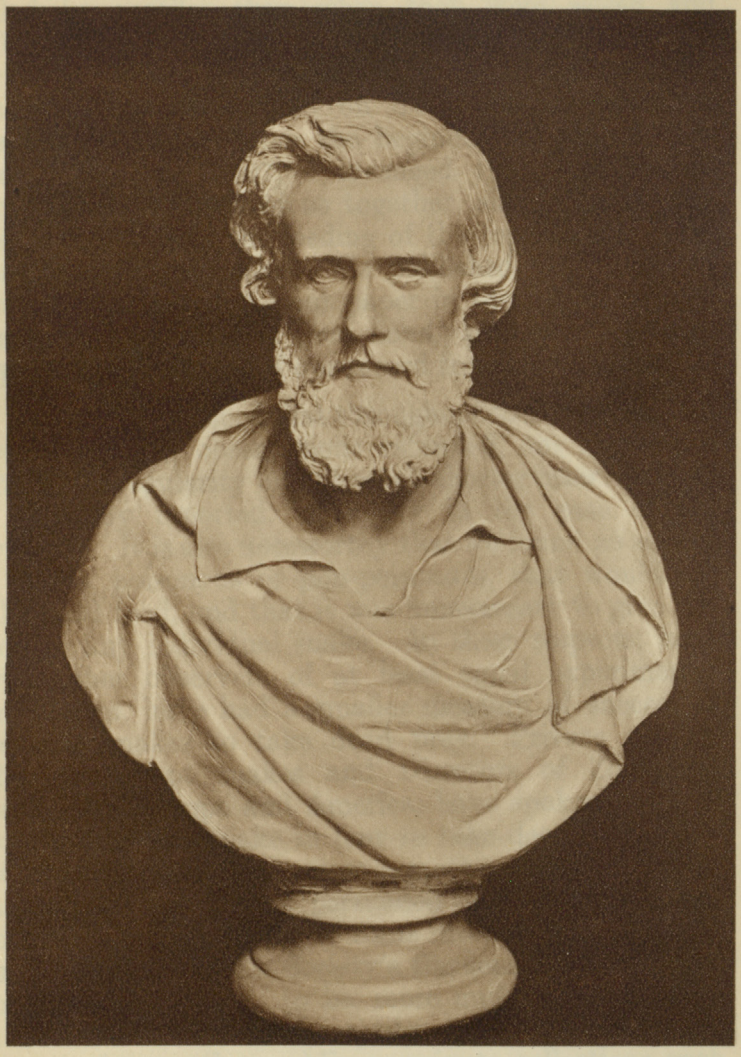
constrict, especially those living chiefly on fish, so far as I have noticed, seldom let go of their prey once they have seized it, but swallow it rapidly, turning it round in their jaws to the most convenient position, if the mouthful is large. The others, constrictors and poisonous snakes, as a rule wait for some time after the victim is dead, then feel it all over with the forked, flickering tongue, select almost unerringly the end of the prey which will lead to fewer difficulties in swallowing, usually the tip of the snout in mammals, and set about the laborious process of deglutition.

Now is it a practice so cruel as to bring obloquy on those who countenance it and to require, if necessary, prohibition by law to suppress it, to feed reptiles in captivity on the food they would get in nature ? I have found no trace in the earlier history of the Society of any serious consideration of the question, and the feeding of reptiles on living prey at the Zoo passed with most persons as a plain necessity and with many as an engaging spectacle. There were a few protests. Dickens, for example, wrote a vigorous attack, inspired by his detestation of every form of cruelty. But it seems to have made no impression at the time, partly because, as often happens with emotional appeals, the description of the facts on which it was based was erroneous, still more I imagine, because he was less excited by the cruelty to the animals than by the demoralisation of those who enjoyed witnessing it—a view which at the time had few supporters.

I have been unable to ascertain exactly when the feeding of the reptiles in public on living animals ceased. In the Guides to the Gardens from 1858 onwards, although the times for feeding the lions, otters, eagles, pelicans, etc., were stated, and it is certain that the reptiles were fed on Friday afternoons, there is no mention of the feeding. Old Fellows, however, tell me that the feeding took place regularly and that large crowds visited it.

When I became Secretary of the Society in 1903, I found that the reptiles were fed in private on Friday afternoons, and living animals, except frogs, were not always given. On the other hand, there is no doubt but that a gratuity to the keeper secured a rabbit being put into the cage of a python, and particular visitors were even treated to the spectacle of a goat being seized. Behind the scenes living prey was used freely. I stopped all public exhibitions of the kind, and gave orders that except in cases of necessity, the feeding in private should be done only on animals already killed. But the practice of long years here and elsewhere, and the authority of those who themselves had kept living reptiles, was against my view, not only then but for long afterwards. On the one hand, I was told that I was killing the snakes because of a silly sentimentalism; on the other, from time to time, violent attacks were made on our supposed practices by various organisations and by individual Fellows of the Society. I took the line, supported by the Council, of being ready to explain our practice to any Fellows, or to responsible people for their private information, but I declined to place the Society in the position of appearing to have been bullied into treating our animals according to the views of persons who had no responsibility for them.

In the meantime, I used every opportunity of making personal observations in the United States and in various Zoological Gardens on the Continent so that I could amplify the knowledge I could gain here, from my own study of the actual practice, and not merely the professions of other institutions. There was then no Curator of Reptiles, superintendence of the house being part of the duty of Mr. Pocock, the Superintendent of the Gardens, the actual work being done by the keeper, J. Tyrrell, who had been with us for many years and was extremely competent in the management of reptiles. Quite certainly he did not believe in giving killed food, laughed at the idea that the animals used suffered more when they were



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killed by reptiles than when they were seized and killed by his own staff. I was in some doubt as to the strictness of his interpretation of the order that the "snakes were to be fed on dead animals wherever possible." And so from the beginning of May to the end of October, 1907, I arranged that I myself or Mr. Pocock, or both of us together, should be present every week during the feeding of the reptiles and make notes and observations. We published the results of our observations in a joint paper in the Proceedings of the Society (*Proc. Zool. Soc., Lond.*, 1907, pp. 785–794). I quote the summary of our record from that memoir :—

"It will be noticed that throughout the many months over which our observations extended, our snakes fed with great regularity and at much shorter intervals than is generally reported, especially in the case of the pythons. It is also noteworthy that we found no species of snake, poisonous or non-poisonous, that would not take dead food, and that it was unnecessary to give live food to any individual snake. In these respects, however, other observers of at least equal experimental enthusiasm, have had a smaller measure of success in inducing snakes to take dead prey. Private persons who have kept snakes and Directors of Zoological Gardens in Europe and America, have spoken to us of getting only one snake in four to take dead food. We set it down, therefore, not as a matter of scientific fact that all snakes can be persuaded to this non-natural form of diet, but as one of some interest that with the large collection in the Society's Gardens we have been, and hope to continue to be, more uniformly successful in this mode of feeding reptiles than have been the owners of any other public or private collections with the exact details of which we are acquainted."

I had noticed with special interest here and elsewhere that no one of the living victims ever showed any signs of a specific dread of the snakes. Rats and mice, rabbits, pigeons, chickens and even goats were

much less disturbed when they were put in the cage than when a human being tried to take hold of them. They were all quite indifferent to the presence of the snakes, and even when one of the reptiles approached them directly, they avoided it just as they would avoid a stick thrust at them. The only creatures that I heard making a noise, even when actually caught, were frogs, which either in captivity or in wild nature, scream rather horribly when they are first seized. I carried these observations further by exhibiting a tame living snake to every kind of mammal and bird we had in the Gardens and arrived at the curious and rather unexpected result that only parrots and the higher perching birds, apes, and monkeys—all the primates with the exception of lemurs—showed no dread of snakes, but would come down to the front of the cage, peck enquiringly at or try to smell the swaying head with its protruding tongue, more ready to see if it were good to eat than afraid of being eaten. It is certainly striking that, of all the mammals, only the apes and monkeys, our nearest relatives, show a dread of snakes. Possibly the common prejudice against these exquisite creatures is a dying inheritance from our far-off ancestors.

These further observations, however, had no direct bearing on the subject, as neither this Society, nor so far as I know any other zoological institution, had fed, or proposed to feed their reptiles on parrots, ravens or monkeys. I made my orders more strict, and forbade living prey to be given to any individual except with a specific order from me.

Meantime, the agitation against our supposed behaviour blew up into a gale. I was always ready to explain, and frequently did explain, our rules to any person who wished to know what they were, for his private information. But I continued to refuse to make an official reply to outside bodies which they could publish, and above all I declined to issue any statement

which could be used in condemnation of other Zoological Gardens which might use other methods of feeding. Also, it happened that our own reptiles during these years were not living well; they frequently refused to feed; I refused to relax my rules although the keepers begged me to do so, and were supported by Dr. Plimmer, then our pathologist, an able microscopist who, however, had some extraordinary half metaphysical belief that some virtue passed from a living prey to the creature that devoured it. Questions were asked in the House of Commons as to why the Society was not prosecuted; letters and articles of an amusing violence were published, a famous one, afterwards reprinted under the title "Secrets of the Reptile House," denounced me personally as well as the alleged practices of the Society. I suppose it was trying, but I survived.

In 1911, Mr. E. G. Boulenger was appointed Curator of Reptiles and I explained the general position and my rule to him. He told me frankly that he did not believe in it, but, of course, undertook to do his best to carry it out with absolute strictness. In a few months he was convinced that to get reptiles to take dead food was almost entirely a matter of skill and patience, on the one hand, and on the other of their being warm and in full activity at feeding times. He introduced various improvements into the house, and arranged that on feeding days the furnaces should be stoked a little more vigorously. With his concurrence, I was able, after a few months, to open the house on Fridays during the hours of feeding, by which those who cared for the spectacle, certainly interesting, if rather disgusting, could see the snakes taking their already killed food, and unbelievers be convinced from actual observation what our practice really was.

I have no doubt but that failure to get snakes to take dead prey depends very largely on the condition of the snakes themselves. In our new House, where they are kept at entirely suitable temperatures and

enjoy the stimulus of light, many of them know the feeding day as well as lions know their dinner hour, and are waiting for the keeper to throw in the dead prey which they may seize at once from his wooden tongs, or even, in some cases, take directly from his hand. Others, again, pay little attention to it, either neglecting it altogether or leaving it after they have struck, to devour it during the night. Many reptiles, however, do not feed every week, but after a big meal wait a week or even several weeks. New arrivals seldom feed for weeks or months, and when snakes are about to moult they are seldom hungry. Although every week there are many which can be seen taking and swallowing their food, there are always some individuals who refuse it. The first business on Saturday mornings is to make a round of the dens, note those which have not fed, and remove the untouched food, which, however bloated it may be after a night at a high temperature, is always greedily taken by the crocodiles and alligators.

My rule about no living prey being given except with special and direct authority is faithfully kept, and permission has to be given only in the rarest cases, these generally of very delicate or new-born snakes which are given new-born mice, creatures still blind and entirely unconscious of their surroundings.

Chapter X.

THE GATES AND OTHER MATTERS.

As the prosperity of the Society and the numbers of visitors increased, it became necessary to improve the accommodation for the admission of visitors, especially on crowded days and at crowded times. The three entrance gates had remained unchanged except for minor alterations, since the earliest days of the Society. The establishment of a 'bus service from Camden Town Tube Station, passing St. John's Wood Station and linking up with south-west London, had brought heavy pressure on the North Gate in the Albert Road, which was increased when charabancs began to bring loads of visitors from distant towns. In 1926 the North Gate was completely rebuilt, lavatories were constructed alongside it, and the number of turnstiles increased. In 1927 the South Gate, by which great numbers of visitors entered through the Park, was also rebuilt and enlarged, and, as there was not space for a ladies' lavatory alongside it, that was supplied by a new building near the old Reptile House. In 1928 the Main Gate was also rebuilt, and lavatories placed in connection with it. As, however, it is the entrance by which a majority of Fellows and distinguished visitors come, the opportunity was taken of re-arranging the principal walks leading from it, which were placed at awkward angles, and of building an entrance courtyard and covered pergola.

The post of gate-keeper used to be coveted by keepers who desired, after long service, what they thought an easier job, but the increasing number of visitors required gate-keepers in greater numbers and of a more expert kind. Accordingly, the older type has

been replaced gradually by Commissionaires, with the further advantage that it was found possible to obtain the temporary services of additional men when they were required.

Here something may be said about the prices of admission to the Gardens. At first the public could gain admission only by obtaining an order from a Fellow permitting him to enter on payment. Later on this was abolished and the public were admitted on weekdays simply by payment, or free if they had been given one of the limited number of passes which Fellows receive in return for their annual subscriptions. The prices have remained almost throughout the history of the Society at one shilling for adults and sixpence for children. Notwithstanding the decreased value of money, the Society did not raise prices after the War, except that on Bank Holidays the old rate of sixpence for adults was raised to one shilling. On Mondays throughout the year, however, the price has remained at sixpence, as the Society has taken the view that it ought to give an opportunity to the poorest persons to visit the Gardens. In consequence, Monday is the recognised popular day, and is the most crowded day. During my time excursion rates for large parties have been re-arranged and the facilities extended, and very cheap rates for parties of school children coming with their teachers on educational visits have been introduced.

Admission on Sundays is a separate question. In the early days of the Society the Gardens were thought of as a semi-private place in which Fellows might walk discreetly on Sundays, although it would be improper for them to enter the Museum or to attend Scientific Meetings. At one of the early meetings, the Bishop of Carlisle, then a Member of Council, proposed that matters should be arranged so that the keepers might attend Divine Service on Sundays. There was no thought of the general public being admitted by payment

or otherwise. A little later an effort was made to turn the Gardens on Sundays into a fashionable promenade, but, although it appears from the records that Fellows complained as to the quality of persons who found their way into the Gardens on Sundays as compared with the high character of the company in earlier years, I can find no evidence that there has ever been a decisive change in the character of Sunday visitors. Fellows of the Society have always used their chief privilege, that of having some Sunday admissions to give away, not merely for their personal friends, but for those who would find difficulty in going on weekdays.

At recurrent intervals, however, there have been appeals to throw the Gardens open to the public on Sundays by payment. These have generally come from Fellows when the finances have been at a low ebb, in the hope of gaining a larger income for the Society, and from outsiders when the Gardens have been enjoying a wave of popularity. These proposals have never succeeded. Why ?

The first reason for the Gardens not being open to the public by payment on Sundays is conclusive. Such a step would require a change in the law, for, although it is legal in Scotland and Ireland, it is not legal in England.

Laws can be changed. Why is it improbable that if Sunday opening were legalised we should not avail ourselves of the opportunity, possibly to gain a greater revenue for the general purposes of the Society, or why, apart from a general change, should we not promote a Private Bill to confer on us the necessary powers. In fact, when the Society acquired a country property to develop into a Zoological Park, we did have to promote a private Bill in which, amongst other provisions, we asked for powers to charge for admission on Sundays, but did not extend the proposal to the Gardens in Regent's Park. There are sufficient reasons. The acreage of the Gardens in Regent's Park is approxi-

mately thirty-four, in practice reduced by the canal and the Outer Circle. When there are twenty thousand visitors the Gardens are overcrowded; when, as on fine Bank Holidays, there may be over eighty thousand, spread over the whole day, they are excessively, even dangerously, overcrowded. We have to shut up many of the houses, provide an army of special police and watchmen, make preparations for several days beforehand, and spend several days afterwards clearing the wreckage, getting the Gardens tidy, and nursing the overfed and often unwisely fed animals. The habits of the London population are such that Sunday attendances would be concentrated in the afternoons, and most fine Sundays during the summer would undoubtedly bring such crowds that no reasonable body of persons would undertake the responsibility of advocating the change. The acreage of the new Country Park is approximately 480; it is not in the centre of a great city, and so far as can be reasonably foreseen there is little chance of dangerous overcrowding. Moreover, there is time to lay it out on a scale suitable for crowds.

Certainly it is possible to imagine the opening of the Society's Gardens to the public on Sundays, if at least another hundred acres of Regent's Park were added to its area, and, from some source or other the very large capital provided for laying out the new ground, providing the paths and buildings and refreshment premises suitable for crowds and all the other paraphernalia. But it would make a profound difference in the character of the collection, limiting it almost entirely to the more common and the hardier animals.

It would make a change still more profound in the character of the Society, and, so far as I can see, it would lead directly to the Society dissolving and handing over its concerns to some public authority. If their Sunday privileges were taken away, there would be no reason why persons should remain or become Fellows of the Society, and with their disappearance would

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come the disappearance of the Council. It may be that a public authority would conduct a collection of animals equally well, but I doubt if it could command the advice and hard work of a body of private persons, often much engrossed in other affairs, of scientific men, of distinguished amateurs, such as have composed the Councils of the Zoological Society in the last hundred years. I am certain that the public authority would give less attention to the advancement of scientific knowledge, to the formation of a great library, to experiments in the introduction and proper treatment of "rare and curious subjects of the animal kingdom." The conduct of a public exhibition and the prosecution of the work of a scientific society have been successfully united by the Zoological Society of London, at no expense to the public purse, the two sets of objects in mutual support. The Zoological Society pays rents, rates and taxes precisely as if it were a private company conducted for private profit. It is debarred by its statutes from distributing any profit it might make amongst its Fellows; it does, in fact, spend its income on the improvement of the Gardens, on the education and pleasure of the public and on the advancement of zoological knowledge. There is neither sense nor justice in the clamour heard from time to time that, because it has brought one side of its affairs into public favour, it should hand over that side to the public to its own destruction.

As soon as the new Reptile House was finished, the old Reptile House was emptied of its contents, the floors taken up, the old hot-water pipes in the underground spaces exposed, and the whole building "gutted" and disinfected. For long the house had been infested with vermin, particularly cockroaches, which found the hot-water pipes in their inaccessible conduits, the filth which inevitably accumulated in the recesses of the cages, and the abundance of food, most ideal quarters. The house had long been known as a haunt of the large South American cockroach, a reddish-brown creature

which may reach nearly two inches in length. It is fully winged in both sexes, and in summer these repulsive insects used to fly about in the house after dusk with a noise like that of small aeroplanes. We used to supply them to various laboratories for dissection. During the rebuilding process they were exterminated, although a few, doubtless, migrated to adjoining houses, as is the habit of cockroaches when disturbed. There were smaller numbers of the common cockroach, or kitchen "black beetle," chiefly in the keepers' quarters, the females of which are wingless and the males with wings too short except for feeble attempts at flight. The pale grey small German cockroach, known as the Croton bug, and large numbers of the cheerful house cricket were also present. It is simple to destroy cockroaches by the use of borax in various forms, and I have always hoped to clear the Gardens of them, as they are repulsive, omnivorous, attacking almost every animal and vegetable substance, including labels and the bindings of books, and are notorious carriers of many diseases. But they are a convenient form of food which can be procured at all seasons of the year, and many birds and reptiles are fed on them. Until it is possible to rear in sufficient quantities substitutes such as leaf insects and stick insects, curators and keepers tolerate, or even encourage them.

In the autumn of 1926, the following winter and next spring, the stripped and cleaned shell of the old building was transformed into a house for birds, with extensive outdoor aviaries, on a scheme devised by Mr. Seth-Smith, the Curator of Birds, and a committee of ornithologists. The arrangements have been much admired and, except for the addition of electric light over the indoor cages for use on dark days, familiar lines were followed, as, in the opinion of experts, the conditions for keeping birds in captivity are well understood. A set of large aviaries to accommodate numbers of small birds occupy the middle of the building; there are

compartments of large size for toucans, birds of paradise, hornbills and so forth, and cages for small birds which must be kept separate.

It was hoped at the same time to complete the arrangements for birds by constructing a new Parrot House close to the Bird House, and plans for the purpose were prepared and a scale model of a section set up. The Society's collection of Parrots is one of the finest that has ever been got together, and the old House, which was never intended to be a permanent building (it was originally set up to house Gould's collection of stuffed humming birds), has long been recognised as unsuitable. The richness of our collection, however, proved at present an insuperable obstacle, as the cost of providing compartments of a suitable size and yet in sufficient numbers to accommodate birds that could not be kept together, proved to be enormous.

In 1927 the Council decided on a further large step towards the carrying out of the Gardens Improvement Scheme. An institution like the Zoological Gardens, which receives no support from public funds, but depends on the subscriptions of Fellows and on gate money, must consider not only the comfort and display of the animals, which are its first object, but the convenience of visitors. A very great deal had been done in other directions, but the Central Restaurant accommodation had long been wholly insufficient. It was decided, therefore, to construct a new restaurant with accommodation for Fellows and the public. The plans drawn up before the War were revised and brought up to date, as for example, by substituting electric plant in the kitchen for the older modes of cooking. To prevent the very heavy cost of the new building absorbing for several years funds available for other improvements, we arranged a loan of £45,000 from the Society's bankers, to be repaid as to principal and interest by an annual sinking fund of £5,000, a sum which can well be met out of the profits of the

department. As usual, the Treasurer, Mr. Charles Drummond, assisted us in getting satisfactory terms.

The new restaurant, which should be completed early in the summer of 1929, has been designed by Mr. J. J. Joass. It is of red brick, with stone facings in harmony with the Tea Pavilion, erected as the central block of new buildings designed before the War. It contains Tea and Luncheon Rooms for Fellows and other visitors, and the necessary kitchens and other appurtenances of a public restaurant. The accommodation should provide for the reasonable needs of the Society for many years, especially as in the London Gardens the Restaurant is only an accessory, a convenience for visitors, rather than an independent part of the establishment. In many of the Continental gardens, in contrast, the restaurant and a concert hall are regarded as in themselves money-earning attractions, often, as in winter, used almost separately from the Gardens.

An even more important enterprise undertaken by the Society was the purchase of a country estate for development into a Zoological Park. I shall describe the objects and prospects of that in the last chapter as it concerns the future rather than the past history.

Before I pass from the history of buildings and other improvements at the Gardens it may be of interest to record some of the difficulties that had to be overcome before anything new could be carried out. In the early days of the Society the Commissioners of Woods and Forests exercised a strict control, and the plans of all buildings and "lay-outs" were submitted for their approval. This appears to have arisen because the Crown, in granting building leases within the Park, had undertaken to keep the neighbourhood of a rural character. The restriction related chiefly to the land within the Outer Circle, and either did not obtain, or was very lightly applied, to what are now our Middle and North Gardens. For that reason, the more

important buildings were put in the Middle Garden, and it seems to have been contemplated that the Main Garden should be devoted almost entirely to ornamental aviaries, paddocks and ponds. Later on, buildings were permitted in the South Garden but on the condition that a wide shrubbery should be preserved all round the boundaries, and that the elevation of any erections visible from outside should be approved. When the London Building Acts were passed, it was held that they applied to buildings in the Zoological Gardens, even although these were situated on Crown land.

When I became Secretary the number of stiles that had to be crossed before anything new could be done was formidable. First, the purpose, site and general nature of a building had to be suggested, and approved by the Council. Then draft plans had to be prepared and agreed to by the Garden Committee and Council. The plans had to be elaborated by an architect, and approved, with or without alterations, by the Council. Estimates had to be obtained and, if they were too high, modifications to reduce the cost had to be made and approved. The plans then had to go before the Local Building Authority, and, if there were any deviation of any kind from the routine provisions of the Building Acts with respect to structures or materials, these had to be submitted to and approved by the London County Council. Then, if they were near the frontage or sufficiently large to be seen from outside, they had to be submitted both to the Office of Works and to the Commissioners of Woods and Forests. In the case of each public authority, exact plans had to be submitted, and if consent were given, no subsequent deviation was allowed without a fresh submission of plans. And the alterations had to go back to the beginning and pass through all the hoops once more. Even when each successive Committee or other authority was sympathetic, the process was tedious and exasperating. If, however, there were a substantial difficulty, or a real opponent, then it was a nightmare. When the plans for the new Offices reached the Commissioners of

Works they insisted on a Mansard roof if we required an upper floor. So far as our needs were concerned, the alteration was of no moment and the building authorities readily agreed. But it had to go back to the Council, on which there was at the time a member who objected to the whole scheme. He seized on the point, declared the Mansard roof to be ugly, unwholesome and what not, and was well on the way to convince others that his objection was reasonable. I had to appear entirely obstinate and unconciliatory on matters of hygiene and art, on which one opinion was as good as another, because it would have been imprudent at that stage to say openly that the objection was merely a wrecking move.

In time the process worked more smoothly; the Offices of Woods and Forests and of Works, appreciating the difficulties, came to an arrangement by which the Commissioners of Works gave consent for both bodies; the Chief Architect to the London County Council did his best to smooth our path by the most kindly and considerate help at the earliest stages; we learned to work with the Local Building Authority, and our internal machinery worked more smoothly.

But the Building Acts continue to be a serious difficulty especially in their relation to the use of new materials and new methods of construction, as schedules devised for the general good of the population fit harshly the needs of a zoological society. Accordingly, when the Bill for our new property at Whipsnade was drafted, I inserted a clause freeing us from any Building Acts except so far as they might apply to houses mainly or wholly designed for human habitation, and with some difficulty succeeded in getting it incorporated in the Act of Parliament.

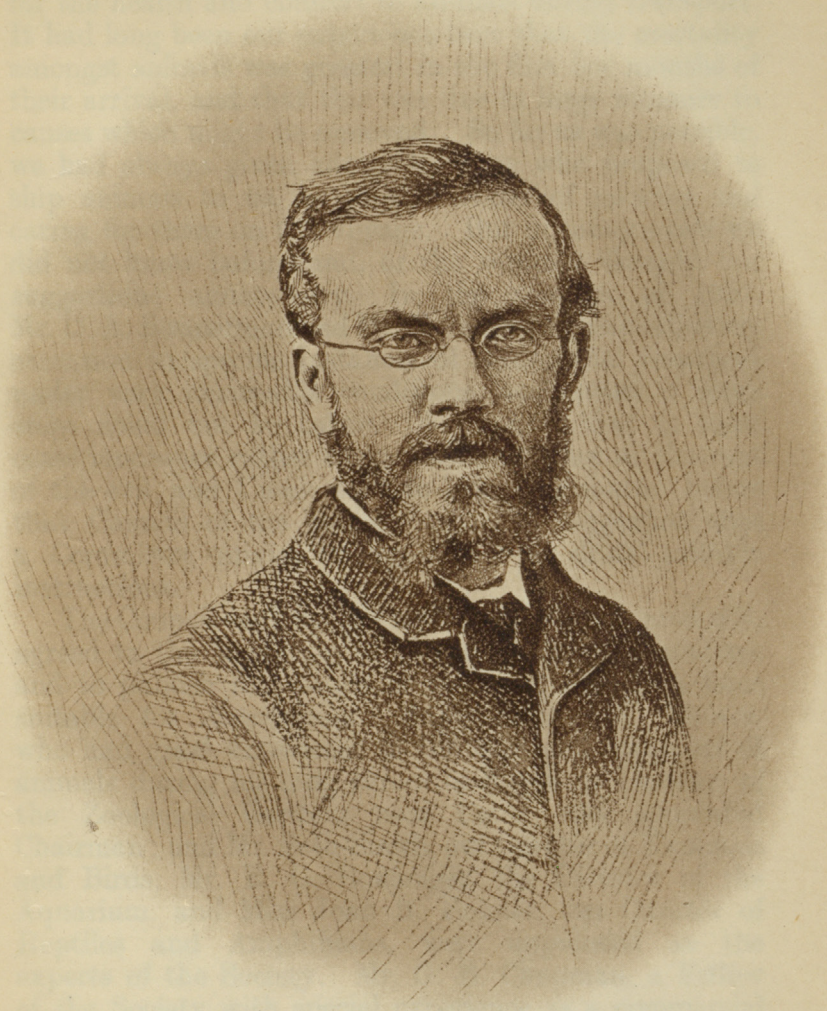
In 1928 a sad and inexplicable event took place, unprecedented in the history of the Society. Sayaid Ali, a Mohammedan mahout, was killed in the Gardens, and San Dwe, a younger Burmese Karen Christian,

also an elephant keeper, was found guilty of murder, sentenced to death, but afterwards reprieved and the sentence commuted to imprisonment for life. During the end of 1921 and the following winter, Indiarana, a fine female elephant presented by the Maharajah of Patiala, which had been accustomed to carry children in the Gardens, became extremely nervous, and the Council decided that it was unsafe to use her in the Gardens. At the suggestion of Mr. Alfred Ezra, a Member of the Council, it was agreed to procure the services of a highly skilled Indian mahout, to see if Indiarana could be brought to reason. Sayaid Ali was selected and reached the Gardens in July, 1922. He was extremely successful and very soon the elephant was more docile than she had ever been, became much attached to him, and learned many engaging tricks. Disliking the winter, Sayaid Ali returned to India in October, but came back in 1923, as he was a great attraction in the Gardens. In addition to his pay he earned handsome sums from visitors, chiefly because he had taught the elephant to pick up and give to him any coins thrown on the ground. He stayed until October, 1925, but returned again for five weeks in 1927 in charge of an elephant that had been presented to us. On June 6, 1928, he came again, bringing two elephants which Mr. Ezra had commissioned him to select as a gift to the Society. The dates are of some importance, as strange myths grew up round the fatality.

In the summer of 1926, a white elephant, the property of Saw Po Min, the leader of the Karen Christians, was lent to the Society for the summer, and was kept in a house which we had set up for it, with a normally coloured companion, and the owner and a staff of Karens. In late autumn of the same year the white elephant went on a tour in America with the Karens. During the American tour, San Dwe went to America direct from Burma, to join the other Karens, and came here with them and the elephant in November, 1927. They were allowed to remain in the Gardens until January

31, 1928, whilst shipment to India was being arranged. They actually remained at Barking until April, and then when the party was shipped, San Dwe, at his own request, was taken on by us and put in charge of two rather refractory elephants. White elephants have many legends attached to them, and the owners always maintained that they were in danger of their lives from Burmese who resented the sacred creature having been removed from its native land. But it is of importance to note that San Dwe had never met Sayaid Ali until the latter came to the Gardens in June, 1928, and that Sayaid Ali had never been in England with the white elephant. When the two keepers were together at the Gardens they shared quarters in the special house that had been built originally for the white elephant. Sayaid Ali, as the senior and more experienced man, was given charge of the two refractory elephants, and San Dwe was given sole care of a very young elephant of which he became fond and had already begun to teach to do tricks. Both men were well liked by the other keepers, and, so far as we knew, they were on good terms. The Mohammedan was a tall and powerful man, but quite good-natured; the Karen was slightly built, much younger, bright and lively, and a good musician. Then one night Sayaid Ali was brutally murdered in his sleep and all the evidence pointed to San Dwe as the criminal. We thought it right to give the man, who, in a sense, was in our charge, the help of first-rate solicitors and counsel, but the facts were irresistible. The motive was never known; there was no sufficient reason to suppose that it was an attempt at robbery, but the Oriental mind works in a way which is not easy for us to understand. There was an absurd rumour that the murder had taken place on the same evening as the white elephant died in India. That was not so, and there was no connection of any kind between the crime and the elephant.

A more pleasant feature of 1928 was the completion of an enquiry into the most suitable methods of caring



H. H. Johnston

W. A. Forbes
Prosector, 1880–1882

for the health and comfort of animals during transport. It had long been our experience here that the mortality amongst animals was greatest in the first few months of their arrival, and that this was due in large measure to causes which might be removed. So far as was possible, we had always given advice to those who proposed to ship animals to us, as to the modes of packing and caring for them on the voyage. But in many cases we did not know beforehand, or the shippers thought our suggestions unnecessary. In the summer of 1927, Mr. D. A. Bannerman and Mr. Norman Kinnear called my attention to specific instances of commercial transport under very unsuitable conditions, and asked if some steps could not be taken. We agreed that in most cases ignorance rather than carelessness lay at the root of the evil, and I undertook to bring the matter before that Council of the Society with the suggestion that a Committee might be appointed to draft suitable instructions.

The Council took up the matter with great good will, agreed to the formation of a representative Committee and to publish the results of their enquiries in a form suitable for distribution. Major Stanley S. Flower, who had great experience in the care and transport of animals during his long career in Egypt as Director of the Zoological Gardens near Cairo, was appointed Chairman; and Mr. Seth-Smith, our Curator of Mammals and Birds, Mr. E. G. Boulenger, the Director of the Aquarium, and Miss Joan B. Procter, our Curator of Reptiles and Amphibians, were appointed as the experts of the Society. Mr. G. B. Chapman, a Fellow of the Society with special experience as a commercial importer of animals on a large scale, agreed to serve, as also did Mr. F. N. Grosvenor, representing the P. and O. and Allied Shipping Lines. Various other bodies accepted our invitation to nominate representatives, so that the Committee was strengthened by Mr. Norman Boyd Kinnear, nominated by the Trustees of the Natural History Museum; Mr. D. A. Bannerman,

by the British Ornithologists' Union; Miss E. Maud Knobel, by the Avicultural Society; Colonel A. K. Wyllie, by the Royal Society for the Prevention of Cruelty to Animals; and Mr. P. J. L. Kelland, by the Ministry of Agriculture and Fisheries.

It would have been outside the function of the Committee to investigate with any view to punishment, actual cases of bad treatment, as this would have required procedure of a more judicial character. But many of the members were only too well acquainted with the scope and nature of the existing evils, and were very fully equipped with knowledge of what might be prevented. The general reference given them was to consider all the stages in the transport of living animals from the selection of suitable individuals for travelling to the first care to be given them on arrival at their ultimate destination. These were to include :—

Simple criteria of health and condition before packing.

Securing that selected animals are willing to take the food which can be supplied them during transport.

Suitable boxes, cages and packing.

Directions for hygiene during transport.

Food supply during transport.

Attention required during transport.

Immediate treatment on reception.

Care during temporary detention pending dispatch to ultimate destination.

After discussing the general nature of the problems, sub-committees were appointed to consider separately mammals, birds, reptiles and fishes, and their reports, after further consideration by the whole Committee, were handed over to Major Flower and myself, who arranged them for publication. The full Report was printed in the Scientific Proceedings of the Society (*Proc. Zool. Soc.*, 1928, pp. 631–652), under the title "Hints on the Transport of Animals." Copies were

distributed by the Society to zoological gardens, dealers, shipping agents and similar persons all over the world, and as a routine matter, when a new correspondent offers to send us animals, we post to him a copy of the pamphlet, referring him to the section dealing with the particular case. The Royal Society for the Prevention of Cruelty to Animals has also aided in making the recommendations widely known, and there seems little doubt but that cruelty due to ignorance is now without its excuse.

A public question which has come into prominence in recent years is the training of animals to give performances. Now, in a sense, some of our regular exhibitions are trained animals. Elephants which carry children, stop to pick up coins thrown on the ground, or to beg for buns from strangers, are trained wild animals, for although elephants have bred in captivity, this is the rarest exception. Sea lions which climb on a particular rock, wait until a fish is tossed to them, or make a flying dive to catch it in the air, are trained animals, generally wild-caught, although they breed in captivity much more frequently than elephants. Chimpanzees which sit round a table to drink milk out of mugs and to hand one another plates of food, are without any doubt trained wild animals. So far as I know or can trace, the Society has never gone further in the direction of exhibiting trained animals. It may be noticed that in these examples there is no forcing of the natural instincts of the animals concerned, and I can bear witness to the fact that such training can be carried out without the slightest compulsion of the animals. Why an elephant is friendly to man almost as soon as it is caught, and is with another already accustomed to man, I do not know, but it is so; as with the dassies or hyraxes, their remote but nearest living relatives, friendliness to people who treat them well is a natural part of their mental "make-up." What the sea lions do in the Gardens is the slightest modification of their way of life in nature; those born here, or newly imported

wild-caught animals, take to the routine almost without being shown it. Chimpanzees, like many other monkeys, in addition to their readiness to mimic movements or actions they see, are natural clowns, actually of their own accord inventing tricks to gain an attention which they covet and enjoy.

But the training of animals can be carried much further, to tricks which are not merely outside their natural instincts but directly opposed to them. Many Zoological Gardens exhibit such performers, and we have frequently been offered and have refused either animals already trained or the services of persons who undertook to come to us to train our animals. Opinions differ on how far cruelty is a part of such training. The late Carl Hagenbeck, who had a great affection for animals, and a large part of whose business was their training to be sold to circuses, insisted that cruelty was neither necessary nor advantageous, and, certainly his trained lions and tigers showed a real affection for him. But I am far from sure. Most animals are not vindictive, and easily forgive cruelty from their friends. I shall not easily forget an incident in illustration of this. An itinerant Basque had been convicted for cruelty to his bear, and when he went to jail, the police asked us to take charge of the animal. It was morose and sulky, spent all the time it was with us moping in the darkest recess of the enclosure in which we put it. The keepers could do nothing with it. In due course the released Basque came with an interpreter to claim his bear. I was anxious, and went to see the meeting. The outer cage door was opened and the Basque, making a low call, at once crept in and crawled to the inner den. The maltreated bear at once came out with every sign of delight, put his paws round his owner's neck, and began hugging and licking him with screams of joy. I am still of the opinion that cases like that of Hagenbeck and the Basque are very different from what lies behind the usual performances I have seen, and that especially when an exhibition has to be done to an exact

time, as for instance when an advertised "turn" is due, the whip in the hand of the trainer is more a memory and a warning than a mere symbol of authority. Opinions differ as to the amount of pleasure to be derived from seeing animals doing actions that are unnatural to them, and, although there has been much pressure on us both from Fellows of the Society and from outside, to associate the Society with the defence of circus and music-hall performances in which trained animals are concerned, I do not think that there is any probability of the Society ever doing so. For my own part, I am strongly opposed to "performing animals," both as a zoologist and as a humanitarian.

Chapter XI.

MEDALS, LECTURES AND LEGACIES.

At the Monthly General Meeting of the Society held on February 4, 1836, it was resolved, on the motion of a Mr. Cox, seconded by Mr. R. Gordon, to request the Council to set aside the sum of "£100 annually for affording premiums or prizes for the introduction or breeding of new and rare animals; or for other objects connected with the practical department of zoology, to be given in the ensuing Spring season." A similar suggestion, made in 1832, had been agreed in principle, but postponed to a more convenient season. The Council appointed a Committee and reported to the Monthly Meeting of January 5, 1837, that in acordance with the recommendations made they had decided to "offer six medals annually, by way of premiums, for subjects connected with Zoology." In the Annual Report for the same year they added that the intentions of the Council with regard to the medals had been made known to the "Fellows and to the public by advertisements in four morning newspapers." Two designs for the proposed medal had been drawn by an eminent artist, which had been approved of by the Council, and further steps had been taken for the preparation of dies. The "eminent artist" was Thomas Landseer, who, at the same time, designed a seal for the Society, consisting of a lion couchant, in a barred cage, with the inscription, "Zoological Society of London, 1829." The medal had on the obverse a group of birds, including a crane, stork, swan, spoonbill, pelican, eagle and parrot, with the inscription, "Zoological Society of London, 1826," and on the reverse an elephant, rhinoceros, giraffe, some kind of humped cattle, and of goats. The dies were made by Mr. Benjamin Wyon.

The Society, however, was just entering a period of depression, under Barlow and Ogilby, and although I can find no reference to any definite proposal to drop the medals, none of them was awarded for many years, and the idea of encouraging domestication, or breeding, by annual rewards seems to have disappeared. On December 1, 1847, the first medals of the Society were given. They were in silver and were awarded to Sir Roderick Murchison and M. Dalmatoff "for assisting in the introduction of the Aurochs." The name of the animal was misapplied, for it was the European Bison, usually called the Wisent or Zubr. "Aurochs," although sometimes used for that animal by sportsmen, really belonged to the extinct European wild ox. Murchison, the famous geologist, had been employed on a geological survey in Russia, and through his influence the Tzar Nicholas I agreed to present a pair of young animals. M. Dimitri de Dalmatoff, Master of the Imperial Forests in the Government of Grodno, described their capture in a paper written in French and communicated to a Scientific Meeting of the Society held on January 25, 1848 (*Proc. Zool. Soc., Lond.*, 1848, pp. 16–20). The Master of the Forests related that since his appointment in 1842 he had paid particular attention to the forest of Bialowieza, which he believed (probably erroneously) to be the last refuge of the European Bison. He insisted that other authors had been in error in saying that Bison calves could not be nourished by domestic cattle; he had proved that if captured when young they would suckle cows, and this was confirmed in our Gardens, for the young bison for some time after their arrival were given cow foster mothers to which they took.

He related that when he had received the order from the Tzar, which was the result of "Queen Victoria's wish to have two living bisons in the London Gardens," he was convinced that animals captured when adult would not live in captivity and accordingly he proposed to secure two young calves which he would

have fed by cows in the Forest Dairy Station. At dawn on July 20, 1846, he set forth on his task, accompanied by three hundred beaters and eighty foresters, the latter armed with guns charged only with powder, so as to alarm but not to damage the bison.

The party, he wrote, reached the valley in which the herd were known to lie in profound silence. He himself, with thirty of the most skilled and reliable foresters, crept silently into the dark valley, round which the beaters had already been posted. As they looked over the edge they saw the herd lying peacefully on the slope of a hill, the adults chewing the cud, the calves gambolling round. At the sudden sound of the hunter's horn the animals rose up as if by magic and seemed to concentrate all their faculties in the senses of sight and hearing. The calves pressed against their mothers timidly. Then when the dogs with the hunters began to bay, they formed into the order usual to them when attacked; the calves were placed in front and the bulls kept in the rear to guard the herd against the pursuing hounds. When the moving herd reached the line of beaters the order was changed; the bulls charged to one side and the other, clearing away the beaters, the rest of the herd following them. But the hunters in the meantime had detached some of the calves, in the end securing a male and three females. The youngest of the females, only a few days old, at once took to a domestic cow, similarly coloured to her own mother, but died in a few days. The others would take nothing for twenty-four hours, after which the youngest took to another cow, and the two older drank milk, first out of a man's hand and later from pails. The male, which was nearly fifteen months old, remained morose for months, but in the end became attached to a particular peasant and afterwards showed no fear of human beings or wish to attack them.

M. Dalmatoff rather hoped that the bison might be crossed with domestic cattle, and the experiment seems

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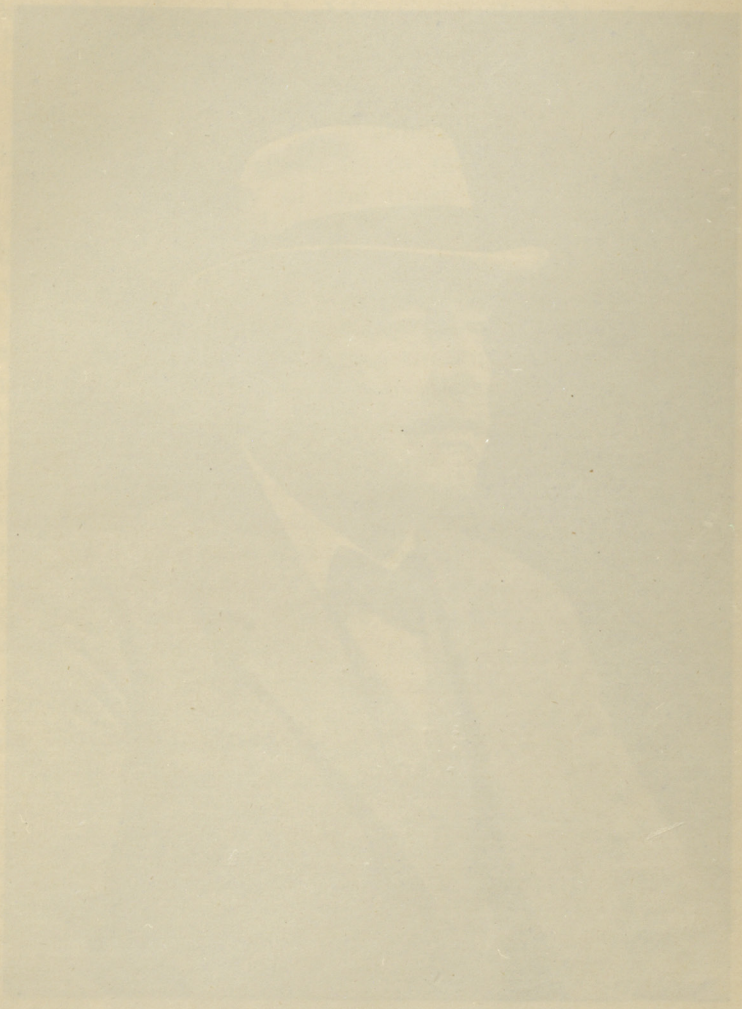
Prosector, 1882–1915



only not to have been tried in London from the absence of sufficient accommodation. It is not a wish with which modern naturalists would sympathise, but, unfortunately, it was carried out successfully in more than one Continental collection, with the result that some of the survivors of this species are not of pure race. In the same way the American bison has been crossed with domestic cattle, the progeny being called "cattaloes," and some of the stock still shows contamination.

Since the first introduction of the species for which the Silver Medals were awarded, European bison have been introduced on many occasions and have bred in London and in the private park of the President. During the war, however, the wild stock was nearly or completely exterminated and the effort is being made by an International Society for the preservation of the Wisent to secure the future of the species. A stud book is kept and every effort is made to record the births, deaths and relationships of the few individuals still surviving in zoological gardens and private possession. There is some hope that the efforts will be successful. They are supported by the Zoological Society.

In 1859 nine Silver Medals were given to commemorate the arrival in England of a large collection of Himalayan pheasants. One of the primary objects of the Society was the introduction of exotic pheasants, but no serious attempt was made in that direction until 1856, when formal application was made to the Governor-General of India for assistance in obtaining a number of Himalayan species. Viscount Canning and a group of officers whom he had charged with the duty secured a large collection belonging to more than six genera. The intention was to keep the birds in confinement in India until they had become reasonably tame, or to breed from them and send home pheasants reared under domestic fowls. The outbreak of the Indian Mutiny interfered with the progress of the experiment,

but a number of birds reached this country and medals were conferred for their efforts on Viscount Canning and eight others, of whom the best known in the history of zoology was Brian H. Hodgson.

Later in the same year a silver medal was awarded to William Dougal Christie, H.M. Minister to Brazil, for many donations from Brazil, and early next year also to Sir George Grey for " his numerous donations of South African animals." The gift from South Africa included a male of the now extinct quagga, the second example of the species exhibited by the Society, but the Council clearly had the future in view, for they mentioned in their report, in announcing the award of the medal, that they hoped to obtain examples of the common zebra and the Abyssinian wild ass, the " only two species wanted to make a perfect series of all the Equidae known to exist in a state of nature." The first example of the common zebra, however, was actually presented by Sir P. E. Woodhouse, Governor of Cape Colony, in 1864.

Silver medals have continued to be awarded at irregular intervals and for very different reasons, and it may be an important duty of the Council at some future time to revert more to the original intention of the Society and present medals annually for specific contributions to zoology, in the form of the introduction of very rare animals, or for direct contributions to knowledge. A full list of the awards from the beginning is printed annually in the List of Fellows, but some of the more interesting presentations may be cited here.

In 1869 Sir Rutherford Alcock was given the medal in commemoration of his having presented a pair of Père David's deer. Sir Rutherford Alcock was Ambassador at the Court of Pekin and the deer had only been recently discovered as new to science. They were to be found only in the Royal Park at Pekin and differed from all other Old World types in that the antlers had no brow-tines. They were described, with a coloured

plate, in the Society's *Transactions* in a memoir by Dr. Sclater on various species of deer (*Trans. Zool. Soc., Lond.*, Vol. VII, pp. 333–352). The plate was drawn from the young pair, but two woodcuts were also given, showing the antlers when mature and in the velvet. Nothing was known of the origin of these deer, which resemble in certain respects New World types. They have long been absolutely extinct in China, but fortunately there is a small herd in the private park of the Duke of Bedford, who is trying to preserve the species. From time to time the Duke has sent a male for exhibition at the Gardens.

Another award, in close accord with the original intention of the medals, was made to Mr. George S. Mackenzie, in 1893, who, when he was Administrator in British Central Africa, sent home many interesting animals, including a pair of Waterbuck antelopes. These bred in the Gardens, so far as is known, for the first time in captivity. The mother and young were represented on a coloured plate in the *Proceedings* (*Proc. Zool. Soc., Lond.*, 1893, p. 505).

Other medals were awarded for donations containing animals of value, although not necessarily new, or for a large series sent as a single collection or spread over a number of years. Amongst these recipients may be mentioned The Sultan of Zanzibar (1875, for African animals), the Rev. G. H. R. Fisk, of Cape Town (1884, for donations of Reptiles), the Maharajah of Kuch-Behar (1887, for an Indian Rhinoceros), E. W. Harper (1902, for many Indian Birds), Sir William Ingram (1908, for Birds of Paradise), R. E. Drake-Brockman (1914, for many donations, chiefly from North Africa), Albert Pam (1914, for many donations, chiefly South American), W. K. Pomeroy (1914, for many donations, chiefly from Colombia), H. G. F. Spurrell (1914, for many donations, chiefly from Africa and South America). It was the intention in 1914 to give medals more frequently, and a beginning was

made with the award of four in that year, but the War stopped carrying out the idea. In 1917, however, a silver medal was awarded to Wilfred A. Smithers for a long series of gifts from South America, in 1921 to Sir Cecil Armitage, Governor of the Gambia, for a recurring series of gifts of West African mammals, birds, reptiles and invertebrates, and in 1926 to H. C. Brocklehurst, Game Warden of the Sudan, for assisting the Society in obtaining some very valuable mammals and birds.

Silver medals have also been awarded to persons who have made zoological explorations and brought back collections of specimens which have added to knowledge of systematic zoology, as, for example, to E. D. Dickson (1889, for zoological specimens presented to the Society), H. H. Johnston (1894, for zoological investigations in British Central Africa), Alexander Whyte (1897, also for investigations in British Central Africa), Charles D. Rudd (1909, who financed a series of collecting expeditions to obtain specimens for the British Museum, in South Africa), and R. B. Woosnam (1909, who led collecting expeditions to South Africa, Ruwenzori and Persia).

The silver medal has also been given to members of the staff for some special service. Thus, A. D. Bartlett, the Superintendent, was given it in 1872, in connection with the successful rearing of a hippopotamus born in the Gardens; Arthur Thomson, in 1904, when he retired on pension after thirty-four years' service; D. Seth-Smith, in 1908, on his return from Australia in charge of a collection of animals made under his superintendence; John Young, in 1921, head gardener, when he retired on pension after forty years' service. Old friends of Young who recall his admirable work in the Gardens will be glad to know that he is enjoying his pension (1929) in Australia, where he went to join a married daughter.

The Society's medal, struck in bronze, has usually been given to keepers for special services. In 1866,

Henry Hunt, Mathew Scott and Benjamin Misselbrook were awarded it for success in rearing foreign animals in the Gardens; in 1872 it was received by Michael Prescot and Arthur Thomson, keepers, and again in 1927 by Ernest Bowman, keeper, in each case in connection with the successful birth and rearing of a hippopotamus.

The Society's medal, struck in gold, has been awarded only twice. The first occasion was in 1877, when the Council were able to announce that the Prince of Wales (afterwards King Edward VII) had consented to accept it in "acknowledgment of his many valuable donations to the menagerie and of other favours." The medal was presented to the Prince in person at Marlborough House by a deputation of the Council, consisting of the President, Vice-Presidents and Secretary, and "was most graciously received."

Sir Harry Johnston was the only other recipient, the gold medal having been awarded to him in 1902, in "connection with his discovery of the Okapi." In December, 1900, Sir Harry had forwarded to Dr. Sclater two native bandoliers, which were first taken to have been made from the skin of some undescribed species of zebra. In the covering letter Johnston had written:—

"Reading Stanley's 'Darkest Africa,' I noticed that he mentions his dwarf having a word for horse or ass, and stating that such animals were found in forests. As the ordinary zebra type of equine steadily avoids dense woodland, this statement seemed to me a curious one. While I entertained for months the pygmy band who had been captured by a filibustering German (and the restoration of whom to their homes was one of my motives for going into the Congo Free State), I questioned them on this subject and they were very explicit; they told me they called the animal 'O,'Api' (', stands for a gasping sound like an aspirate or Arabic H). They described it as being dun-coloured

or dark grey all over the upper parts of the body, with stripes on the belly and legs."

"Whatever the animal may be to which these pieces belong, it is not any one of the known zebras or wild asses; the pieces of skin unfortunately exhibit chiefly the stripes of the belly and legs."

On this intriguing but imperfect information, Sclater was justified in assuming the skins to belong to an animal hitherto unknown to science, and he gave a short description, and named it *Equus johnstoni*, sp. nov. (*Proc. Zool. Soc., Lond.*, 1901, II, p. 50). He gave a figure of the bandoliers and gave the animal the popular name "Johnston's Zebra," although he was doubtful if it would not require to be put in a new genus when more information was obtained. Two skulls and a skin of the new animal were sent to the British Museum by Sir Harry Johnston. Sir Ray Lankester (then Professor Ray Lankester), the Director of the Natural History Departments of the Museum, exhibited these at a Scientific Meeting of the Zoological Society on June 18, 1901, and, on the fuller information obtained from them, recognised that they belonged not to an equine but to a giraffine animal of an unknown genus which he named *Okapia*, a native name for the animal given by Johnston. According to the rules of priority, Sclater's specific name held good, so that the Okapi became *Okapia johnstoni*. So remarkable a discovery as that of a new large mammal allied to the giraffe well deserved the highest honour that the Society could confer. The Okapi lives in the dense forests lying between Lakes Albert and Edward, in the Congo Free State. Many skulls, skeletons and skins have now reached Europe. Shortly before the War I heard of a living example in the possession of a Belgian and had arranged to buy it. The Government of the Congo Free State, however, insisted on its going to Belgium. It reached Antwerp, but did not live many weeks. Since then at least one other example has reached Belgium.

In 1870 a legacy of £2,000 was bequeathed to the Society by a deceased Fellow, Alfred Davis. The terms of the bequest left the Council complete freedom. They were as follows :—

"To the Zoological Society of London, the sum of £2,000, such sum to form a Perpetual Fund, the income from which is to be applied to, or the creation of Annual Prizes, or any other purpose which may seem to the Council or governing body of the Society most conducive to its interests." After deduction of legacy duty of ten per cent., the sum was invested.

In their Report read to the Annual Meeting in 1872, the Council said that they had considered "various ways in which it might be proposed to expend this sum in the interests of zoological science, in accordance with the primary objects contemplated by their Charter." They had determined to give the interest of the fund for 1871 to the "Zoological Record Association," the object of which (*see* p. 120) was "acknowledged by all naturalists to be of primary importance as regards the progress of zoology, but one which cannot be carried on, at any rate for several years, so as to render it self-supporting."

The same course was adopted in 1872 and 1873, but there was some dissatisfaction regarding the appropriation to zoological bibliography, a highly technical subject, of a fund which might have been applied to a purpose of value to a larger number of Fellows. The Council reconsidered the matter and early in 1874 resolved to devote it to semi-popular lectures. The announcement was as follows :—

"The Council have long been of opinion that the instructiveness of the Society's collection of living animals would be much increased by the establishment of lectures upon their classification and affinities, and upon other zoological subjects of a like character. There have been many difficulties to interfere with the execution of this plan. But, as an experiment in this

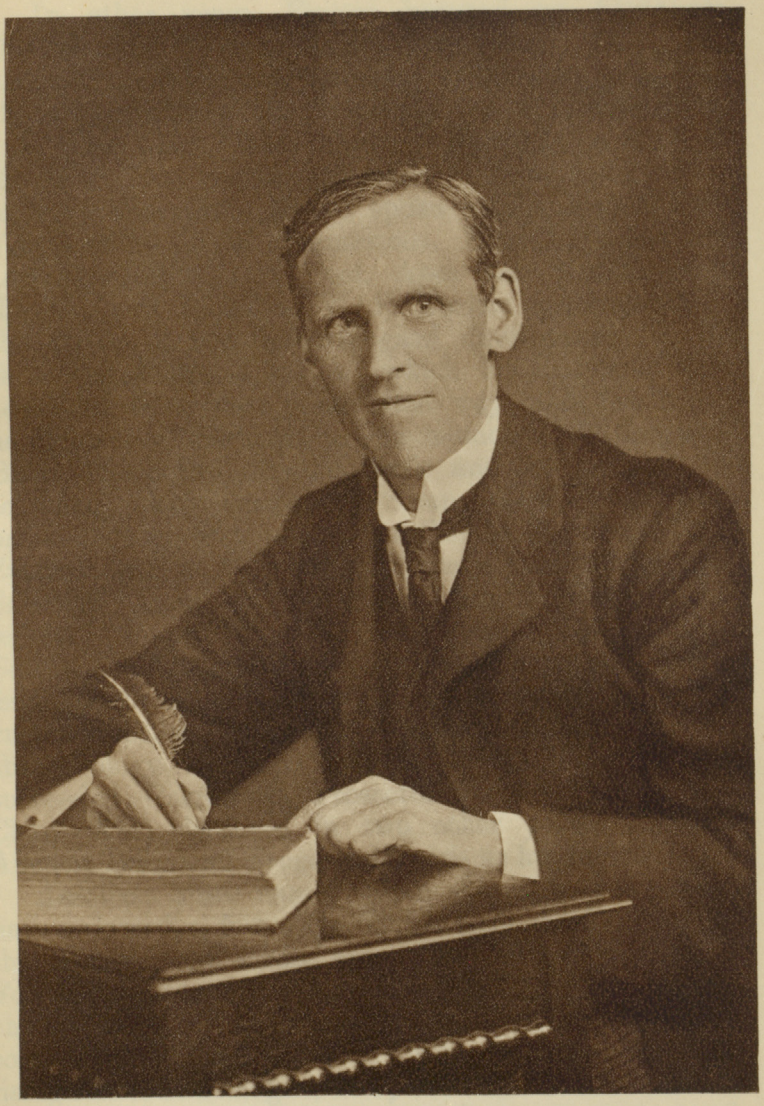
direction, the Council determined to appropriate the interest of the Davis Fund of 1874 to the establishment of a series of Lectures upon Zoological subjects, to be given in the Picture Gallery in the Society's Gardens in the Regent's Park, on Tuesdays and Fridays at 5 p.m., between Easter and Whitsuntide."

The lectures were made free to Fellows of the Society and their friends, and to other visitors to the Gardens. Dr. Sclater gave the first of the course under the title, "Introductory Lecture on the Animals in the Gardens," and followed with four on a special subject of his own, the "Geographical Distribution of Animals." A. H. Garrod, the Prosector, gave four lectures on "The General Classification of Vertebrates," and Dr. W. B. Carpenter two on "The Aquarium and its Inhabitants."

From that year until 1887 the lectures were continued on similar lines and were successful in attracting good audiences. A very large number of the more prominent zoologists gave individual lectures or courses. The course for the year 1880 may be taken as typical. Most of us would be glad to have to-day the chance of hearing the same men discoursing informally on the same subjects.

1880.

Date.	Subject and Lecturer.
Thursday, June 3 ...	Teeth, Professor Flower, F.R.S., P.Z.S.
Thursday, June 10 ...	Cats, Professor Mivart, F.R.S.
Thursday, June 17 ...	Tadpoles, Professor Parker, F.R.S.
Thursday, June 24 ...	Hawks and Hawking, J. E. Harting.
Thursday, July 1 ...	Cuttle-fishes and Squids, Professor Huxley, F.R.S.
Thursday, July 8 ...	Waterfowl, P. L. Sclater, F.R.S.
Thursday, July 15 ...	Birds, W. A. Forbes.



From a Photograph lent by Mrs. Sonntag

DR. C. F. SONNTAG
Prosector, 1919–1925

In other years, Flower lectured on Elephants, Rhinoceroses, Tapirs, Horses and Zebras, Sloths and Anteaters, Whales, Porpoises, Dolphins, Flightless Birds, Armadillos, the Evolution of Ungulates, Pigs and their allies, and Man, zoologically considered, the key-note of his addresses always being comparative anatomy. Mivart spoke on Kangaroos, Bats, Frogs and Toads, Chameleons, British Snakes and Lizards, Hands and Feet, Apes and Lemurs, and the Study of Zoology. W. K. Parker was engaged on the study of the embryological development of the skull and limbs, a subject which his exquisite work advanced in a most unexpected way, and the topics he chose recall his more serious memoirs—the Limbs of Birds, Crocodiles, the Lamprey and its kindred, Insectivora, the Structure of the Swan. T. H. Huxley gave one lecture on Snakes, and another on Sea-urchins and Starfish, and in 1878 took all the lectures of the year, devoting them to the Crustacea. Sclater himself lectured at least once in most years. He described Continental zoological gardens from his personal knowledge of them, gained on annual visits he paid, discussed Reptiles, Swifts and Swallows, Monkeys, Parrots, the Zoology of New Guinea. W. A. Forbes, who succeeded Garrod as Prosector to the Society (*see* Chap. XII), lectured in two other years, choosing Ancient Birds and Frogs and Toads as his topics.

Amongst other names which should be recorded I have selected a few. Mr. F. E. Beddard lectured on the Ancestry of Birds, soon after he had succeeded Forbes as Prosector. F. Jeffrey Bell, known latterly chiefly from his eccentricities in dress, had recently come from Oxford to London with great promise as a rising scientific zoologist, had joined the British Museum (Nat. Hist.), in which he was to do great service, and was Professor at King's College, lectured on Recent Advances in Zoology and on the Breathing of Aquatic Animals. Professor W. R. Carpenter, F.R.S., lectured on the Naples Marine Biological Station, then recently

founded. Professor Boyd Dawkins, F.R.S., gave an address with the interesting title, "The British Lion," but whether it dealt with heraldry or archæology I do not know. Professor Martin Duncan, F.R.S., the father of the present Librarian of the Society, lectured on Insects and their Metamorphoses. A. H. Garrod, the most brilliant Prosector in our history, lectured on Birds, Reptiles, the Man-like Apes, and on *Ornithorhynchus*, the strange "duck-billed mole" of Australia, which he had been dissecting.

J. E. Harting, editor of the Natural History section of *The Field*, and a man of the widest information on what may be called the country gentleman's side of zoology, lectured on British Extinct Quadrupeds, Birds and Lighthouses, Dogs, Ancient and Modern, the Domestic Cat and Beavers. E. Ray Lankester, F.R.S., then still Professor at University College, gave an address on Scorpions. James Murie, the first Prosector, lectured on Manatees, Hornbills, and Nocturnal Animals. G. J. Romanes, F.R.S., who had been studying the intellectual qualities of the chimpanzees at the Gardens, spoke on "Instinct." H. Seebohm, ironmaster and ornithologist, not long back from his expedition to Siberia, lectured on Siberian Birds and on Birds' Nests. R. Bowdler Sharp gave two lectures, respectively on Birds of Prey and on African Birds. W. B. Tegetmeier, one of the best-known naturalists of last century, an authority on bees, domestic fowls, pigeons, pheasants, and on the drama, lectured on Variation in Domesticated Animals. Tegetmeier had given Darwin many facts used in "The Variation of Animals and Plants," and had always deplored the fact that experiments in the crossing of animals were not being made in the Society's Gardens.

Everyone who knows anything about zoology and zoologists in London in the second half of last century will appreciate the catholicity with which the lecturers and the subjects were chosen. If evidence were required,

the lecture list is sufficient to bear witness to the esteem in which Flower, the President, and Sclater, the Secretary, were held, and the great use made of the Davis bequest.

In 1887, however, a change which proved unfortunate was made. The University Extension movement was becoming active in London, and F. E. Beddard, the new Prosector, had given a course in 1886, at a centre outside the Society. He applied for leave to hold the next course in the Gardens; this was granted, and he was made "Davis Lecturer," the lectures to be open free to Fellows of the Society, but other persons to pay a fee of 10*s*., which covered free admission to the Gardens. This arrangement was repeated in 1888. In the following years Beddard was again appointed Davis Lecturer, but gave only six lectures each year, which were free to Fellows and the fee to other persons was reduced to 5*s*., also covering admission to the Gardens. Although Beddard was a good lecturer he did not attract a scientific audience, and as the courses were no longer in connection with the University Extension Society, the audiences they drew were rather casual. The numbers fell off and in 1892 the last course, consisting of only four lectures, was given.

But there was another reason. The Society was in low water; the Council had called the attention of Fellows to "the continued falling off in their numbers, now for the first time for many years reduced to less than 3,000." There was a similar falling-off in gate money and in other sources of income. It was necessary to economise. But at the same time complaints had arisen as to the efficiency of the *Zoological Record*, and there was an opportunity to replace the editor, who had not proved entirely satisfactory, by Dr. David Sharp, F.R.S., a scientific bibliographer of distinction. But the new editor had to be paid, and accordingly the interests of systematic zoology triumphed, and the income of the Davis Fund was turned over to the *Zoological Record*.

But complaints arose that interests of the Fellows generally were being sacrificed to a subject of which only a few could take advantage. In the end of 1895 a Committee consisting of Mr. Bateson, Dr. Blanford, Sir Joseph Fayrer, Professor Howes (Huxley's successor at the Royal College of Science) and the Secretary, appointed to advise, recommended that the Prosector be asked to give a course of ten popular lectures at the Gardens on Saturday afternoons, the subject to be "The Mammals in the Society's Menagerie." The lectures were to be free, and the lecturer was to be paid a fee of £50, and in addition, £5 was allowed for diagrams. The course was duly given in 1896, but the audience was disappointing. In 1897 the subject was changed to Birds, and as Saturday afternoons had provided only a casual and shifting audience, the day was changed to Thursday and a fee was charged to all but Fellows. In 1898 the Prosector again gave a course of ten lectures on Reptilia, the syllabus being printed in advance in the Annual Report of the Council, and the arrangements of the previous year being repeated. In 1899 the arrangements were again similar, the subject being "Aquatic Mammals," and the number of lectures being reduced to eight.

But the courses were flatly a failure, and in 1900 the idea of making them an attraction at the Gardens was given up and it was decided to have only four lectures, with a fee of £10 for each, and to have them delivered in the Meeting Room at Hanover Square immediately after the Monthly Meetings. Mr. A. Smith Woodward (now Sir Arthur Smith Woodward, F.R.S.) gave the first on the "Animals of Australia," Professor Ray Lankester the second, on the "Gigantic Sloths of Patagonia," Mr. G. A. Boulenger, F.R.S., the third, on the "Freshwater Fishes of Africa," and Mr. Beddard the fourth, on "Whales." Fellows could get tickets free for themselves and two friends, others had to buy single tickets for each lecture at 2*s.* 6*d.* Tea and coffee were supplied after each lecture. In 1901 the arrange-

ments were repeated. Professor C. Stewart, F.R.S. Conservator of the Museum of the College of Surgeons, a speaker of quaint charm, lectured on the "Protection and Nourishment of Young Fishes"; Professor Herdman, F.R.S. (afterwards Sir William), lectured on "Biological Stations at Home and Abroad" with special reference to marine biology, his individual subject. Professor Poulton, F.R.S., lectured on "Mimicry," with coloured lantern slides, then an innovation, and Mr. Beddard took "Rhinoceroses" as his subject. In 1902, again, there were four lectures, after the Monthly Meetings, as before, Professor H. G. Seeley, F.R.S., taking "Flying Reptiles," Professor Cossar Ewart, F.R.S., "Horses and Zebras," Professor Ray Lankester, "The Okapi," and Mr. Beddard, "Elephants."

But although some of the lecturers attracted audiences, on the whole the courses were not a success, and the Re-organisation Committee, which met in 1902, was well justified in not continuing the experiment. Whether another attempt should be made is difficult to say. The Society has now an excellent Lecture Room at the Gardens, and lectures with a special object have succeeded there, as, for examples, the lectures to school teachers, and those on Flies and on Rats. On the other hand, the attempt to provide peripatetic guide-lecturers in the Gardens was a lamentable failure. Excellent guides were selected but the audiences which followed them round the Gardens on the arranged tour did not keep together. A very few faithfully followed the round, but others lingered behind to see more of some particular animal, and were replaced by idlers who, seeing a crowd round a den or enclosure, thought the inhabitants were going to be fed.

The Davis bequest is the only legacy of magnitude that the Society has yet received, and in fact we have not made appeals, perhaps unwisely, for posthumous

help. There is an interesting bequest which may be of importance much later. Herbert Spencer, the philosopher, who is at present outmoded by persons with a more emotional and vaguer attraction, died on December 8, 1903. He was never a Fellow of the Society, but recognised our capacity for advancing natural knowledge. Under his will, his property was vested in trustees, directed to carry on his work in Descriptive Sociology until its completion, or until 21 years after the death of the last survivor of all the descendants of Queen Victoria alive at the date of his death. Thereafter the property is to be realised and the sum given in equal parts to the Geological Society, the Geographical Society, the Linnean Society, the Anthropological Institute, the Zoological Society, the Entomological Society, the Astronomical Society, the Mathematical Society, the Physical Society, the Chemical Society, the Royal Institution and the British Association, or such of them as shall then be in existence, or shall accept the gift, upon the condition in each case that the sum received shall, within five years from the date of payment, be spent by the Governing Body for the purchase or enlargement of premises, or for books or apparatus, or collections, or for furniture or repairs, or for equipment, or for travellers, and donations of instruments of research; but in no way or degree for purposes of endowment. Moreover, the will directed that if the purposes to which the income is to be applied by the trustees, do not absorb it, and if the balances accumulate to £6,000, then £500 is to be given to each Society as an instalment of the ultimate benefaction and subject to the same conditions. But it looks as if there would be more grist for the lawyers than for the Societies.

In 1921 the executors of Major Henry Jones, F.Z.S., handed over to the Society a magnificent set of drawings made by the testator. Major Jones had devoted many years to the minute study of birds, and had made coloured drawings representing with scientific accuracy and almost

Oriental beauty every detail of the plumage of males and females in the breeding and eclipse seasons, and of the young in various stages. What their value is in terms of money, it would be impossible to say, although very substantial offers were received by the Society for some of them. The whole collection, however, has been bound in folios, and is carefully preserved in the library.

In 1927 we received a legacy of £150 from the estate of Miss M. Ironside-Jackson, which was expended on the purchase of garden seats. In 1928 the late Mr. F. H. T. Streatfeild, a Fellow of the Society, bequeathed the sum of £300 without specifying an object. It was expended in the erection of a shelter for visitors near the new Bird House. In the same year we received a legacy of £50 from the late Colonel J. W. Yerbury, also a Fellow of the Society. Many years before he had left a letter with me, and, in accordance with the wishes in that, the amount is being spent on additions to the Library, chiefly on entomological subjects.

Chapter XII.

RESEARCH.

Animals are mortal, and when they die in the Gardens several questions arise as to the use of their bodies. In certain cases they may be so rare that their proper destination is a museum. Such cases do not happen often now, partly because most of the great museums are already provided with the animals that come here, and still more because they prefer to have skins, skeletons or whole animals killed for them whilst they are in the best of conditions. From our own point of view, *post-mortem* examination by experts is of great value. When a disease is infective, it may be necessary to isolate any animals that were in contact with the creature which had died, and to take immediate steps for the disinfection of adjoining cages and compartments. In our present system, disinfection follows the death of an animal as a matter of routine, but where there is actual or suspected danger, the Pathologist sends immediate warning to the Superintendent and the Curators, so that sanitary precautions may be taken within a few minutes after the body has reached the *post-mortem* room. Apart from preventing infection, knowledge of the cause of death may lead to preventive measures in the case of other animals. Lastly, the bodies of animals are invaluable for the study of comparative anatomy and pathology, as fresh material is much more useful than material roughly preserved in the field.

From the earliest days of our history we have supplied material to anatomists on which valuable scientific research has been done. Everard Home, Owen, Huxley, Flower, Ray Lankester, Victor Horsley and many other famous anatomists came to the Gardens

ZOOLOGICAL SOCIETY.

ADMIT AND PARTY.

To the Gardens, Regent's Park,

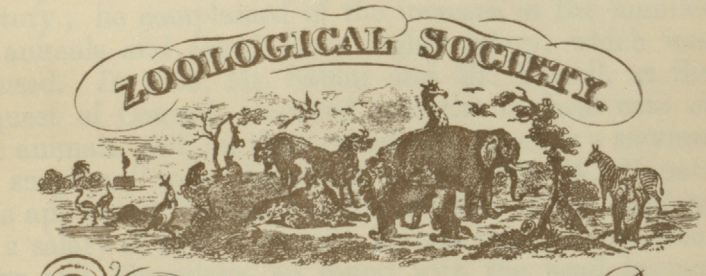
BY ORDER OF *Wm. Yarrell*

ADMIT AND PARTY.

To the Museum, 33, Bruton Street,

BY ORDER OF *Wm. Yarrell*

EXTRACT FROM REGULATIONS—'Strangers may be admitted either to the Gardens or Museum, by written Orders from Members, upon payment of 1s. by each Person.'
No Admission, except to Members, on Sundays.



Admit _____ and Party
to the Gardens or Museum.

_____ F.Z.S.

Each Person to pay One Shilling.—No admittance on Sundays.

Sold by J. Higgins, Cornhill, opposite Jamaica Coffee House

to dissect or had bodies sent to them. The late Sir Frederick Treves and Sir John Bland Sutton carried out long investigations here which not only added to scientific knowledge but were of direct value in their distinguished surgical work. More recently, Sir Arthur Keith, Professor Elliot Smith, Professor J. P. Hill, and many others have made important use of our material.

For nearly thirty years in the early history of the Society there was no attempt made to combine scientific investigation with treatment of the animals. In 1829, on the recommendation of Sabine, the treasurer, the Council appointed Mr. Charles Spooner, of Cook's Row, Camden Town, as "medical attendant" at the Gardens, the payment being at the rate of £60 per annum, and the duties to "attend three times in each week, and oftener when necessary, to prescribe for and examine all the animals and to keep a record of his observations and practice." There are records of reports having been read, but not of their contents. Mr. Spooner does not appear to have been very satisfactory; he complained of the increase in the number of animals and asked for a higher salary, which was refused. In 1833, Mr. Sabine and Mr. Yarrell, at the request of Council, enquired into the medical care of the animals, and, on their report, Mr. Spooner's services as surgeon "were dispensed with." Mr. W. Youatt was appointed "medical superintendent at the Gardens at a salary of £100 a year." He was to attend on Mondays and Thursdays, go round with the head keeper, or his assistant, inspect every animal and give directions. He was also to be ready to attend, if summoned, in an emergency. A room, with a case of instruments and medicines, was provided, and the medical superintendent was to make *post-mortem* examinations to ascertain the cause of death.

This was William Youatt, the author of the well-known treatises on the Horse and the Dog. He was a veterinary surgeon in practice in Wells Street, Oxford

Street, the founder and editor for many years of the *Veterinarian*. He continued in his post at the Gardens until his death, at the age of 71, in 1847. No successor seems to have been appointed. The treatment of the animals was left in the hands of the Superintendent, with occasional advice from the staff of the Royal Veterinary College at Camden Town. In this condition it remained, practically without alteration, until 1909. So long as the Superintendent and his assistant were experienced in the care of living animals, as certainly was the case with A. D. Bartlett and Arthur Thomson, and whilst expert advice and assistance in acute sickness or cases requiring operation could be obtained, the system was fairly satisfactory. But these conditions were not in existence for a good many years after the death of old Bartlett, and in 1907 the reports from the Society's Pathologist pointed to the need of a change. Accordingly it was decided to build the existing sanatorium which was designed so that there were isolated wards for sick animals upstairs, and that the compartments for larger animals on the ground level were also isolated. The sanatorium was put in charge of keepers who had been trained at an institute for enquiry into tuberculosis. Messrs. Sewell and Cousens were appointed Consulting Veterinary Surgeons to the Society, and arrangements were made for regular inspection of the animals. Towards the end of 1910, however, Messrs. Sewell and Cousens found it necessary to resign, as their own professional work did not leave them sufficient time for regular visits to the Gardens. By the kindness of Sir John McFadyean, the Principal, and the Governors, a system of co-operation was arranged with the Royal Veterinary College at Camden Town. Professor Macqueen and Professor Wooldridge, who had already been giving advice from time to time, accepted the appointments of Honorary Consulting Veterinary Surgeons to the Society, and Mr. B. Gorton, also of the staff of the College, was appointed acting Veterinary Surgeon at a small salary. Mr. Gorton

attended daily and was in special charge of the Sanatorium. This arrangement continued until the middle of the War, when Mr. Gorton was required elsewhere.

An unforeseen difficulty arose in the working of the sanatorium system. It was our intention that, as soon as any kind of animal which it was possible to move seemed out of condition, it should be removed to the sanatorium, which was well provided with fresh air, heat and sanitary conditions. But there was a curious reluctance amongst many of the better keepers to send their animals out of their charge, a reluctance which almost reached the length of not notifying cases of sickness. The feeling had substantial foundation. Most animals dislike change of surroundings and of those to whom they have been accustomed. They cannot be told that they are unwell and are going to be better looked after than is possible in their usual homes. In short, this psychological factor often outbalanced the effects of better hygiene, and the animals moped and did not recover in many cases in which the keepers were satisfied that they themselves could have done better. As a result of our experience we have come to use the sanatorium chiefly as a quarantine station for new arrivals, and as a sanatorium only for animals requiring surgical treatment or isolation. The ideal, doubtless, is to have a sanatorium attached to each department as, for example, in the new Reptile House, in which sick animals can still have regular attention from those whom they know.

After the War we did not appoint a resident veterinarian, but called in Professor Wooldridge more frequently. Since Dr. Vevers, who is a medical man with special experience with animals, has been Superintendent, with direct charge of the sanatorium, Professor Wooldridge's advice has met with an intelligent sympathy.

In 1865 Professor Huxley, who was then a member of the Council, was apparently dissatisfied with the use

of the material at the Gardens, and, on his initiation, a Committee consisting of himself, Dr. Gray, of the British Museum, Professor Flower, Professor Busk, and the Secretary, was appointed with the reference "to consider the mode by which the animals dying in the Gardens may be disposed of with most benefit to Zoological Science."

The Committee recommended that regular *post-mortem* examinations, which had not been made since sometime during the life of Youatt, should be "carried out in a systematic manner in the interests of Zoological and Pathological Science." They proposed that a dead house and dissecting room, properly equipped, should be provided, that a Zootomical Committee, consisting of three members of Council and the Secretary, should be appointed in which should be vested all the bodies of animals which had been the property of the Society. Applications for the study of these should be addressed to the Committee and adjusted by it. A qualified person to be called the Prosector was to be appointed at a salary of not less than £250 a year; the Superintendent was to transfer every body at once to the dead house, notifying the Prosector, who should then dispose of it according to the instructions of the Committee. If the destination were a museum or other institution, the Prosector was to be responsible for dispatching it speedily, with due notice, keeping a record. But if only skins or skeletons had been assigned, the Prosector, before sending these away, was to determine and record the cause of death so far as his examination did not destroy the skin or skeleton for their ultimate purpose. On bodies not so assigned, the Prosector was to carry out investigations according to the orders of the Committee, keeping notes and presenting the results of his work to Scientific Meetings of the Society, with a view to their publication in the *Proceedings* or *Transactions*.

The Committee clearly foresaw the conflict of interest that might arise and probably had arisen between the

rival claims of pathological examination, requisitions for the untouched bodies, or for undamaged skins and skeletons, and the pursuit of anatomical research. The rules they drafted, although in time they fell into neglect, were admirably adapted to keep matters straight, and although we were in ignorance of them, we devised a set practically identical with them when the Prosectorium was re-organised soon after I became Secretary.

The Council accepted the Report of the Committee and instructed it to advertise for candidates for the post of Prosector. This was done; twenty-eight applications were received from which Dr. Gray, Professor Huxley, Mr. Busk, and the Secretary selected Dr. James Murie, the appointment of whom was duly confirmed by the Council.

James Murie (1832–1925) was born at Glasgow and graduated in medicine at the University there in 1857, upon which he was appointed pathologist to the Glasgow Royal Infirmary. In 1858 he became assistant in the Museum of the Royal College of Surgeons, in London, under the famous Professor Quekett. Two years later he visited many of the Continental anatomical museums and then made several voyages as ship's surgeon on trans-Atlantic vessels. Next, he became medical officer and naturalist to Consul John Petherick's expedition towards the sources of the White Nile to meet the explorers, Speke and Grant. On his return to England, bringing with him large collections of plants and fishes, he was again engaged by the Royal College of Surgeons to arrange and catalogue Quekett's vast collection of microscopic slides, until his appointment as Prosector.

Murie was a man of wide knowledge and great ability, but in many ways difficult to get on with. He was industrious and dilatory, broad-minded and opiniative, and disposed to present the side of his character most opposed to the views of those under whom he had to work. In his five years' tenure of the Prosectorship

he made *post-mortem* examinations of over four thousand animals, and kept a most careful record of his observations. He presented annual summaries of the deaths, although these summaries were usually late. He had preserved his MS. copy of these and gave them to me in his extreme old age. Allowing for the pathological knowledge of the time, they were admirable, and should have been of considerable assistance to the Council and Secretary. He drew elaborate inferences from them which appear to me to be sound, but were presented in such a way that they were a direct criticism of the management of the Gardens. Too many animals died from injuries, dirt and defective drainage, injudicious feeding, exposure in unsuitable places, absence of sunlight and general neglect. That he was correct, there can be little doubt; that he was offensive, whether deliberately so or not, no doubt whatever.

On the other hand, part of his duties was to make anatomical studies on the rarer animals that had died and present these to the Scientific Meetings. He did the work, but did not turn his notes into papers ready for presentation. Especially in the later years of his tenure, the Zootomical Committee and the Council, and especially the Secretary, were genuinely anxious for a good output of anatomical research, believing that the scientific reputation of the Society could best be maintained in that way. The more strenuously they demanded the fulfilment of that part of the Prosector's duties, the more savage he made his pathological reports. The state of affairs could not last; differences of opinion became personal quarrels on which the Council had to adjudicate, and in 1870 Murie, who had been genuinely worn out by his own obstinacy, was allowed to resign on the grounds of ill-health. His salary was continued for six months on the understanding that he would complete the anatomical memoirs which he had in preparation. These, respectively on the Hyæna, the Kagu, the Pilot Whale, the Sea Bear, the Saiga Antelope, the Prong-buck and

Manatee were duly completed and published in the *Transactions*, with illustrations. It is fair to his memory to say that his scientific memoirs published by the Society and elsewhere were extremely valuable additions to descriptive anatomy. But it is also fair to recall that later on when he became an official of the Linnean Society, although he did a vast amount of useful work, in the end his quarrelsome obstinacy forced his resignation from his post there. He was granted a small pension, retired to a cottage at Leigh-on-Sea, where he lived the life of a recluse. On his occasional visits to London, in his extreme old age, he often visited me and gave me much advice. He used to speak of his old quarrels with a kind of grim humour, chiefly directed against himself, for he had long lost any feelings of rancour although he was still convinced that he had always been in the right.

The illustration of him is from a photograph of a bust which is the property of the Linnean Society.

The Zootomical Committee, early in 1871, set about getting a new Prosector, and their choice fell on a very different type of man. Alfred Henry Garrod, who was appointed Prosector in June, 1871, and held the post until his premature death in October, 1879, at the early age of 33, was the son of Dr. A. B. Garrod, F.R.S., a distinguished London physician. He was educated at University College School and then entered University College, where he studied science under Sharpey, the physiologist, Oliver, the botanist, and De Morgan, the mathematician. After matriculating at the University of London, he gained a scholarship at King's College, where he gained all the highest prizes as a medical student, and, in 1868 got his licentiate from the Apothecaries' Society. Next he went to Cambridge, where he won a scholarship, and ultimately a Fellowship at St. John's. As an undergraduate he published physiological papers in the *Journal of Anatomy and Physiology* and in the *Proceedings* of the Royal Society.

His work at Cambridge consisted more of original research than of a regular course as at that time study in Natural Science was imperfectly organised, but he worked at zoology in the museum.

He had not completely finished his " Tripos " when he was appointed Prosector, and did not actually begin the work of the post until the end of 1871, but from the first day of his arrival at the Gardens he threw himself with complete energy into the duties of his post. Garrod was at first interested in physiology, but quickly turned to comparative anatomy, for which the material at the Gardens gave the widest scope. He did not pretend to pathological knowledge or to any special interest in that, although with the assistance of Edward Ockenden, whom he brought from the *post-mortem* department at King's College Hospital Medical School, two years later, he kept punctilious records of the more conspicuous causes of death. He broke new ground in the anatomy of birds and within two years of his appointment he drew up a scheme of classification of that group based chiefly on their muscular anatomy. Before his death he had contributed to the Scientific Proceedings of the Society no less than 73 memoirs dealing with birds and mammals.

All his work was characterised by extreme accuracy and a remarkable independence of view. He read widely, but there can have been few scientific workers who broke more fresh ground in so short a time, and scientific ornithology owes more to him than to any single writer whose work I know. Quite probably, had he lived longer, he would have modified some of his confidence in the systems of relationship he based on his observations, as he was a pioneer exploring new fields by new methods. He rapidly won fame and esteem. He was elected Professor of Comparative Anatomy at King's College, London, in 1874, and Fullerian Professor of Physiology at the Royal Institution in 1875, posts entirely compatible with his duties

as Prosector. He was elected to the Royal Society at the unusually early age of 30. There can be no doubt but that he was in a fair way to become the leader of zoological science in this country, and, in all probability, one of the great figures in the history of science. But he overworked a frail constitution, was attacked with pulmonary hæmorrhage in June, 1878, and died in October, 1879. His collected works were printed in a Memorial Volume in 1881, and the list of subscribers is sufficient witness to the value placed on his work. They included Charles Darwin, Francis Darwin, F. M. Balfour, T. H. Huxley, W. H. Flower, E. Ray Lankester, Alfred Newton, H. H. Johnson, Max Fürbringer, von Berlepsch, Jentinck, A. B. Meyer, Hans Gadow, Fairfield Osborn, D. G. Elliott, and a large number of libraries at home and abroad.

Garrod brought to the Society Edward Ockenden, whom all who have done scientific work at the Gardens within the last half-century will remember gratefully. He was a young porter in the *post-mortem* room at King's College, and, taught by Garrod, soon learnt zoological names, methods of injection and preservation, the making of skins and skeletons. He remained at the Prosectorium until 1906, and during his 33 years' service there he acquired a very extensive knowledge of all the side of morbid anatomy that did not require bacteriological training. He kept the records admirably and was of the greatest assistance to all who worked in the laboratory. Everyone had a good word for the knowledge and civility of Ockenden. In the end of 1906, in the course of a reorganisation of the garden staff, the Council thought that Ockenden's knowledge of the diseases of animals and his ability to recognise and name new arrivals would be of an advantage in a different post, and they were also glad to give him outdoor work after his long service in a laboratory. He was, therefore, made head-keeper, and two years later Assistant Superintendent. In both of those capacities his knowledge, civility and assiduous attention

to his duties were conspicuous. Latterly, rather too much advantage was taken of his clerical powers; Garrod, who was punctilious in the keeping of records, had taught him, as Ockenden used to say, to write, setting him round-hand copies and tearing up his work if a single letter were slurred. Ockenden died rather suddenly in July, 1925, to the universal regret of all who had known him.

In January, 1880, the Zootomical Committee recommended and the Council appointed William Alexander Forbes, B.A., Scholar, and afterwards Fellow, of St. John's, Cambridge, to the post of Prosector, on the same terms and conditions as his predecessor. But there was now no question of pathology. Forbes had no medical training and was simply a naturalist with a special interest in systematic zoology. He had neither the brilliance nor the wide knowledge of Garrod, but he did extremely capable work and was always ready with papers for the Scientific Meetings.

Forbes was born in 1855, the second son of J. S. Forbes, the railway director. He was educated at Winchester, then passed a year at Aix-la-Chapelle, after which he went to Edinburgh, where he began the medical curriculum. But he paid most attention to zoology and botany, and began to make collections of insects and plants. In 1875 he came to London, and entered at University College, still with the intention of taking a medical course. But he soon passed over directly to zoology, and, on the advice of Garrod and other zoological friends, entered at St. John's, Cambridge, and took his degree with honours in the Natural Science Tripos in 1879. He was then a well-known ornithologist, and, on Garrod's death, was appointed to the Prosectorship without competition. At once he took up the work with enthusiasm and began to read papers at the Scientific Meetings in the first session after his appointment. In the summer of 1880 he was given leave in order to make a collecting expedi-

tion to Pernambuco, in Brazil, and spent his holiday next year visiting museums in the United States. In July, 1882, he was given leave to visit West Africa, but died of dysentery at Shonga, four hundred miles up the Niger.

Forbes' work, of which a Memorial collected edition was published soon after his death, was more that of a systematic naturalist, in the strict sense, than the investigations of Garrod. There were some valuable anatomical papers, notably on the anatomy of Passerine birds, on the organ of the cloaca known as the *bursa Fabricii*, and on the Uakari monkeys, but even in these his interest was more in the information anatomical characters might give as to systematic position than in morphology. His output was very large, considering the short duration of his life and the time he gave to collecting expeditions. Like Garrod, he was universally liked, got on admirably with the Council, Zootomical Committee and Secretary, and was on the way to make a considerable name for himself as an ornithologist.

The death of a second admirable Prosector was a serious blow, and the Council deferred consideration of a successor until the end of 1883. In the meantime, the duties of the post were taken on by "Mr. W. R. F. Weldon, of St. John's College, Cambridge" (afterwards Professor Weldon, F.R.S.), a friend both of Garrod and Forbes. During his short tenure, Weldon worked assiduously, dissecting nearly everything that came his way. Afterwards he often spoke to me of the advantage to a young zoologist of having such a varied opportunity before he settled down to specialisation—a view that I remembered later on when the whole question of the Prosectorship came up for consideration. Weldon published three good little anatomical papers in the *Scientific Proceedings* based on his work in the dead-house.

In January, 1884, the Zootomical Committee selected three candidates out of thirteen applications. They

were Weldon, D'Arcy W. Thompson and Frank Evers Beddard, of whom the third was recommended to Council and duly elected. The reasons for the selection are not recorded, and it is interesting to recall that, of the three, Weldon achieved prominent reputation before his early death, and D'Arcy Thompson is the distinguished naturalist, fortunately still at work. Beddard remained Prosector until he retired on pension in 1915. He died suddenly of a heart attack in 1925.

Beddard was born in Dudley in 1858, the son of a prosperous business man and was educated at Harrow and New College, Oxford. At Oxford he collected moths and butterflies, took a great interest in field natural history, and after taking the old undivided course in Natural Science, he graduated with honours. He was then appointed to the staff of naturalists, engaged under Sir John Murray in Edinburgh in working out the collections of the "Challenger" expedition. Beddard was assigned the Isopod Crustaceans. The results of his work appeared in Vol. XI (1884) and Vol. XVII (1886) of the "Challenger Reports," and he was at once recognised as an accurate and careful descriptive zoologist. In Edinburgh, too, he began to take an interest in earthworms, a group at which he worked for the greater part of his life and on which his most permanent reputation is based.

Beddard had no knowledge of and little interest in morbid anatomy and pathology, and the Zootomical Committee, which met only three times between his appointment in 1884 and 1903, does not seem to have troubled in the least degree over how he spent his time provided always that he was at any moment ready to supply Dr. Sclater with papers for the Scientific Meetings. And certainly he produced papers ; in 1902 he published a list of his contributions to Zoology, in which there were 239 separate memoirs and nine books cited. They were of varied merit ; those on earthworms were recognised as of high value and gained for him the Fellowship

of the Royal Society in 1892. Those on other subjects were of less value, in some cases due to his desire to satisfy Sclater by producing anatomical evidence for the placing of particular birds in a scheme of classification.

Beddard had been appointed Vice-Secretary on more than one occasion and Assistant-Secretary from 1900 to 1903. He was a formal candidate for the Secretaryship on Sclater's resignation, but he had little taste for the routine and worry of administration, and did not press his claims.

In the course of the general re-organisation which took place in 1903, the Council appointed a new Prosectorial Committee to consist partly of Members of Council and partly of Fellows co-opted for their interest in anatomy and pathology, to which was added, later, parasitology. A pathologist was added to the staff with the duty of determining the cause of death of every animal, unless its body had been definitely reserved untouched for some special purpose. The Prosector was encouraged to pursue the course he had always adopted, of giving every opportunity to other anatomists either by sending them preserved material or allowing them to dissect in the laboratory. With regard to his own investigations, he was requested to select a special line of investigation and present papers only when his investigations had reached some definite stage. Under the new arrangements, Beddard continued to work during the rest of his tenure, and produced a number of memoirs, chiefly on parasitic worms and on the vascular anatomy of reptiles. Although he disliked changes and was disposed to resent the authority of the Committee, his genuine good nature and desire to help other zoologists allowed him to work in complete harmony with the successive pathologists who became his colleagues.

On Beddard's resignation, it was decided not to appoint a successor during the War, but Mr. F. Wood

Jones (now Professor Wood Jones, F.R.S.), of the University of London, very kindly undertook the charge and preservation of the anatomical material, in which he was assisted by Miss K. Lander, who was completing her medical studies. In the course of 1919 he left to take up a Chair of Anatomy in Australia. Miss Lander continued to act as Honorary Prosector until the middle of 1919, when she wished to give all her attention to her medical career. As the pathological work had also been carried on by a volunteer who wished to be relieved, the Council, on the advice of the Committee, decided to make two permanent appointments, one a Prosector at a salary of £400 a year, who should be in charge of the laboratory, and the other a Pathologist, at a salary of £250, the smaller salary being possible because there was a hope of getting a pathologist who was willing to be partly a voluntary worker. In the end, as a temporary arrangement, Professor Leiper, of the London School of Tropical Medicine and Hygiene, who was a member of the Prosectorial Committee, agreed to act as Director of the Prosectorium for a year, and Dr. Charles Sonntag, M.D., F.Z.S., was appointed Anatomist, and agreed to carry on both the anatomical and pathological work under the direction of Dr. Leiper until a pathologist could be found. In order to provide for an efficient collection and examination of the parasites, Dr. G. M. Vevers, who afterwards became Superintendent of the Gardens, was appointed Honorary Parasitologist. Dr. Leiper remained Director of the Prosectorium until 1921, during which time he organised the work. On his resignation from pressure of other duties, Sonntag was put in charge.

Charles Frederick Sonntag, M.D., Edinburgh, remained Prosector until his death from tuberculosis in October, 1925, at the age of 37. He had been a specialist in medical hydrotherapy, but when the War came, entered the R.A.M.C. and served in Salonika, and on being invalided he became hydrologist at the Military Orthopædic Hospital at Golders Green, and Officer in

charge of the Research Department of the Red Cross Clinic for Disabled Officers in Great Portland Street. There he came in contact with several London anatomists who recommended him to the Zoological Society. In his six years' tenure of the post of anatomist he contributed no less than thirty memoirs on vertebrate anatomy to our *Scientific Proceedings* and wrote an important book on the morphology and evolution of apes and man. He was gaining an enduring reputation as a comparative anatomist, and from month to month his work, at first chiefly descriptive in the narrower sense, was gaining in breadth and vision.

There was a danger that the anatomist, if he worked in isolation in our laboratory, might become narrow in his outlook. The Council, recognising the stimulus that might be gained from contact with an active teaching school, had welcomed an arrangement by which Sonntag was attached to the Anatomical Department of University College. On his death they decided that the anatomical post should be transformed into a Research Fellowship, tenable for three years, with a possible extension of five years, so that a succession of competent young anatomists should enjoy our unrivalled opportunities for research in vertebrate anatomy. On this new arrangement, Dr. John Beattie, M.Sc., M.B., Demonstrator in the Anatomical Department at University College, London, was appointed Anatomical Research Fellow and allowed to continue to hold his appointment at University College. Beattie resigned his Fellowship in August, 1927, on his appointment to a Professorship in McGill University, Montreal. In the short time he was with us he did valuable research work, and although we were sorry to lose his services, it was in agreement with our intentions that he should receive rapid promotion. As successor, Dr. S. Zuckerman, M.A., a brilliant student who had come from the University of Cape Town to London to graduate in medicine, was selected from a number of suitable candidates and begun his work in January,

1928. He has already made valuable contributions to our *Scientific Proceedings*.

In 1903, when it was decided to appoint a Pathologist as well as a Prosector, Mr. Charles Gabriel Seligman, late House Physician and Pathologist at St. Thomas's Hospital, was selected, but was given leave of absence to go on a Cancer expedition to New Guinea. Dr. Salaman, a Member of the Committee and Pathologist to the London Hospital, agreed to act until his return. A pathological laboratory was fitted and equipped, and, from 1903, every animal except occasional specimens of such rarity that they had to be preserved untouched, has been examined after death by an expert pathologist, exact records of the causes of death have been preserved, and daily notice has been given to the Curators in cases of dangerous infection. The pathologists have reported regularly to the Prosectorial Committee and Council, and, apart from a great body of additions to knowledge of comparative pathology that has been gained by their labours, results of immediate practical importance to the care of the animals have been reached.

Dr. Salaman acted as Honorary Pathologist until Dr. Seligman's return at the end of 1904, and the latter remained in office until 1907 when he resigned to take up an appointment out of England. During his tenure, besides conducting the routine examinations of dead animals, he had made a special study of tuberculosis, which added considerably to knowledge of the incidence of this disease amongst animals. Seligman was succeeded by Mr. H. G. Plimmer (afterwards Professor H. G. Plimmer, F.R.S.), who continued to hold the office until the middle of 1917, when he resigned soon after his appointment as Professor of Comparative Pathology in the Imperial College of Science. Plimmer was a medical man of wide culture, a brilliant pianist and a pathologist of great experience, especially in microscopical technique. He was meticulous in his devotion to his duties, and the careful records

he kept of every individual case accumulated a storehouse of information of permanent value, although he himself was not much interested in combining his results into generalisations. Amongst the more remarkable of his discoveries was the identification of the three forms of tubercle, known as Avian (characteristic of birds), Bovine (characteristic of cattle and other ruminants), and Human, in a single monkey. So far as an isolated fact goes, this seemed to confirm the distinctness of these three types as opposed to the view that they were little more than the forms in which a polymorphic organism might appear in different kinds of animals.

After Plimmer's resignation, Dr. James Alexander Murray, F.R.S., Director of the Imperial Cancer Research Fund, and a Member of the Prosectorial Committee, who had always given great assistance to the Society, volunteered to carry on the pathological work until the end of the War when it was more likely that a permanent successor could be got. In 1919 Dr. Nathaniel S. Lucas was appointed Pathologist, and carried out the duties of the post with energy until his retirement in 1924. In that year the Council accepted an offer made by the London School of Tropical Medicine and Hygiene by which the School was to provide £500 a year and the Society £300 a year for the salary of a full-time Milner Research Fellow in Comparative Pathology. We had the good fortune that Dr. Henry Harold Scott accepted the Fellowship. He was a Doctor of Medicine and not long afterwards became a Fellow of the Royal College of Physicians. He had been trained in Public Health and had a wide experience of human and veterinary pathology in many parts of the world. He remained Pathological Fellow until the middle of 1928, when he resigned to accept an important post under the Secretary of State for the Colonies. Dr. Scott raised the standard of the pathological work in the Gardens to a level it had never reached before, either in direct help to the Curators, or in advances to the science

of comparative pathology. During his tenure it was to the advantage of the Society that the London School of Hygiene and Tropical Medicine was not in full working order, as their new buildings were only in process of erection, so that we had the full time not only of Dr. Scott but of his bacteriological assistant, Mr. Reginald Lovell. On Scott's resignation the Prosectorial Committee very carefully considered the future, as it was evident that when the organisation of the London School was completed it would be impossible that members of their staff could give sufficient time for the work at the Gardens. The Council accepted the recommendation that the new Pathologist should be entirely an officer of the Society. After considering several candidates, Brevet-Colonel A. E. Hamerton, C.M.G., D.S.O., late R.A.M.C., was selected, and accepted the post. Colonel Hamerton has had great experience in pathology and hygiene in the tropics and entered on his duties at the Gardens with an enthusiasm which promises well.

The future of pathological work at the Gardens raises a question of grave difficulty. Each successive Pathologist who has done our work, and in fact every Pathologist whom I have known personally, are convinced that in most cases the identification of a microbial disease requires the injection of the contagium into a living animal, such as a mouse. Clearly not merely the pursuit of scientific knowledge, but the proper care of the animals in the Gardens depend on exact knowledge of the diseases which occur here. But the inoculation of mice with a culture containing a possible contagium, is not only technically vivisection, but an act of vivisection which comes under the most repulsive and the most carefully guarded provisions of the regulating Acts. It implies an operation without an anæsthetic, after which, moreover, the animal is not immediately killed. For purposes of classification, therefore, it requires the same kind of licences and certificates as would have to be obtained by a

researcher working on the physiological effects of pain. The ethical question as to the pursuit of knowledge by methods requiring the infliction of pain is, I think, most difficult for those who by their knowledge and training know most of the vast amount of pain that afflicts the sentient world and the power of knowledge to reduce it. But, fortunately, the problem in this abstract form is not one that a Zoological Society need consider, as it would be plainly improper that the animals under its charge should be subjected to experiment, causing, or that might cause, pain for the pursuit of knowledge. Since I have been Secretary, and to the best of my knowledge and belief, for an indefinite time before then, there has been an absolute rule, confirmed by successive Councils when the occasion arose, that none of our animals should be submitted, in the Gardens or out of the Gardens, to any experiment coming under even the lightest provision of the Vivisection Acts, and in my time we have gone further and not permitted any member of our staff to hold any licence under these Acts. But the latter restriction, of which I personally have always been a resolute supporter, deprives us of using the method of diagnostic inoculation and in so far limits the assistance which pathology could give us in the practical care of our animals. Sometime, it is to be hoped, the Vivisection Acts will be amended on the advice of a Commission, which, containing neither physiologists nor anti-vivisectionists, shall come to a calm judgment, taking extreme opinions only in evidence.

For many years parasites, internal and external, had been collected at the Gardens, chiefly, perhaps, because they yielded species new to science and other specimens useful to museums. Dr. Plimmer had paid personal attention to blood parasites with which his technical skill as a microscopical photographer made him unusually qualified to deal. But although most wild animals harbour parasites, internally and externally, without appearing to suffer unduly from them, there are many cases in which the health of the host is seriously affected.

During Professor Leiper's Directorship of the Prosectorium, he arranged for the careful collection and study of all the parasites, internal and external, by various experts who attended at the Prosectorium for the purpose. The types of new species were presented to the British Museum (Nat. Hist.) and the duplicates were made use of otherwise, including the formation of a named collection for the Society. The knowledge gained in this way has been of great practical advantage to the Gardens, and since Dr. Vevers has been Superintendent, under his care living animals already in the Gardens and new arrivals are examined for parasites known to be dangerous so that preventive measures can be taken. The presence of many internal parasites can be ascertained by the identification of their eggs in the droppings.

The success of the Aquarium gave an opportunity for the study of aquatic life at the Gardens. Accordingly, in 1924, the Council, at my suggestion, instituted an Aquarium Research Fellowship, tenable for three years, and of the annual value of £350, for the prosecution of research into the conditions affecting the life of animals and plants in fresh or salt water, and similar problems. It was thought best to select as the first Fellow some one who could study the physical and chemical conditions so as to lay a foundation for specially biological work. Dr. F. P. Stowell, a graduate in honours of the University of Liverpool, with experience in chemical and physical research, was selected from a number of candidates, and began his work in January, 1925. He held the Fellowship until the middle of 1927, when he resigned to take up an important industrial appointment. He did much scientific work on the changes in the constitution of the water in the Aquarium, published some valuable papers, and was of direct practical assistance to us.

It was decided that the second Fellow should be a biologist, and Miss Eleanor Margaret Brown, B.Sc.

Lond., was selected from a number of candidates, and began work on January 1, 1928. She has already communicated the results of some of her investigations to Scientific Meetings.

At the end of 1902 the only posts under the Society held by or suitable for persons with scientific qualifications were the Secretaryship and the Prosectorship. At the end of 1928 there were, in addition to these two, the following full-time posts open to and held by professional zoologists: Superintendent of the Gardens, Director of the Aquarium, Curators of Mammals and Birds, of Reptiles and Amphibians, and of Insects, Anatomical Fellow, Aquarium Research Fellow. In addition, there is the pathologist, a full-time scientific appointment, and several parasitologists and a bacteriologist who at present are engaged in an honorary capacity.

Chapter XIII.

WHIPSNADE ZOOLOGICAL PARK AND THE FUTURE.

At the Annual General Meeting of the Society, held in April, 1926, the question was raised of a possible extension of the ground occupied by the Society in Regent's Park. It was clear that with the increasing numbers of Fellows and of visitors and the construction of new buildings and more outdoor accommodation for the animals, the area at present occupied was tending to be used beyond its capacity. There was discussion of the situation at the Council Meeting in May, and I undertook to prepare a Memorandum on the whole position. This, after circulation to Members of Council, was discussed at the Meeting in June, and led to our purchase of a country estate at Whipsnade.

The following was the gist of the Memorandum:

At the Annual Meeting of the Society in April, 1903, the Chairman, in reply to a question, promised that the Council would consider the provision of a Sanatorium and Recuperating Station outside London. At a subsequent Meeting of Council the question was considered, but "reluctantly postponed because of more pressing financial needs." At the Council Meeting in July, 1911, an offer by the late Mr. H. J. Elwes to give £50 a year towards the cost of a country station was declined. At the Council Meeting in August, 1921, a proposal by Lord Knutsford to consider moving to the Crystal Palace was declined on financial and general grounds.

I recalled the history of our occupation of land in Regent's Park as already described in this book (p. 150). I added that since the War I had discussed informally with Sir Lionel Earle and other officials the possibility

of the Society getting more land in Regent's Park. They were good enough to tell me that in the event of a Government being willing to give the Society more ground, their advice would have to be against any concession adjacent to our southern boundary. If we were to get additional land from the Park it would be the triangular area running down towards Gloucester Gate. This area, even if we obtained it without conditions such as a free day or the right to the public of Sunday admission, is separated from the Gardens by one of the main walks in the Park and would have to be tunnelled under, or bridged over, and would remain an isolated section of the Gardens, which are already inconveniently broken up by the Regent's Canal and the Outer Circle. As it is on the same clay soil and exposed to the same disadvantages of fog and climate as our present Gardens, it could not be of great benefit to the animals. Moreover, as the land would not be our property but would be let to us on annual tenure, or a very limited lease, the large expenditure on roads, drains and new buildings would not increase our assets. If, on the other hand, the Council were to decide on a country station, it should consist of at least 200 acres in a ring fence, be freehold, have a good sub-soil and exposure. It should be within easy reach of an arterial road, preferably within 70 miles of London, but nearer if possible. In any case, if too far from London to attract visitors, it should be near a town large enough to bring some gate money.

In the event of a suitable property being acquired, the exhibition part of it should be gradually laid out on the most modern system, fences and railings being replaced as far as possible by sunk ditches, and there should be good accommodation for a sanatorium and reserve paddocks for duplicates.

The Council approved in principle the idea of purchasing a suitable area in the country, but suggested that if possible more than 200 acres should be acquired

to provide for expansion, and asked me to make enquiries and report. After long search and inspection of offers that proved unsuitable, Dr. Vevers and I came to the conclusion that the Hall Farm, Whipsnade, the property of the Ashridge Estate Trustees, might suit. The Council visited it, went over the ground carefully and decided to buy it. Later on, two additional pieces of land were acquired rounding off the property, and making it up to approximately 480 acres.

The property, which is to be called Whipsnade Park, is about 30 miles north-west of London, adjoining Dunstable Downs, and nearly midway between Dunstable and Tring, and within easy access of Watford and Luton, which have now large populations. From London the most convenient route is by the Hampstead by-pass and then either by the Watford by-pass to Hemel Hempstead, or by the Barnet by-pass, through St. Albans to Markyate, after which by either route the approach is still by secondary country roads which doubtless in time will be improved.

More than half the area lies above the 700-ft. contour line, and is occupied by woods, rough coppice and grass. To the west and south-west the land drops sharply to the 500-ft. contour, giving a magnificent view to the downland purchased by the National Trust at Ivinghoe. Towards the east the land is arable and pasture, sloping gently from 700 feet elevation to about 600 feet. The subsoil of the whole property is chalk, and the natural contours afford easy drainage. There were, however, several footpaths traversing the property, which, although little used, were public rights of way, making enclosure by a ring fence impossible, and although none of it was common land, there was a local right to dig flints over twenty acres. It was decided to promote a private Bill to allow us to provide a substitute for the rights of way along the edge of the property, and to abolish, after agreed compensation, the right to dig flints, as well as to secure certain other powers, such

as the admission of the public by payment on Sundays and the making of legal By-laws for the regulation of visitors. The Council had no hesitation in trying to get legal sanction for Sunday admission as the area, at least fourteen times that of the Gardens in Regent's Park, will give space for even very large crowds.

Naturally there had to be prolonged negotiations with the local authorities who, however, soon became convinced that the presence of a zoological park would add to the amenities of the neighbourhood and met us in a very accommodating way. The Bill was passed through both Houses of Parliament without opposition, and received the Royal Assent on July 2, 1928, as "The Zoological Society of London Act, 1928."

Until the Act was passed, it seemed unwise to spend much money on a property which the Society would not retain unless it had power to develop it suitably. Mr. J. Spedan Lewis, a Member of Council, had kindly promised to buy the estate from us at the price we had given for it if the Bill should not pass, and, in fact, I had alternatives in view. The vital step of sinking for water seemed necessary, and a borehole was sunk through the chalk and upper greensand with the fortunate result that a supply capable of yielding 5,000 gallons an hour was struck. The only two cottages on the estate were put in order, and a caretaker put in charge. Hedging and ditching and the clearing away of elder which was choking the woods were carried out. An isolated wood was fenced in and provided with nesting boxes so as to turn it into a Bird Sanctuary, and a pheasantry was fenced off and some fruit trees planted. The woods and downland had been unfenced and neglected for years and many tons of broken bottles and other rubbish left by campers and casual visitors were collected and buried. The whole area was surveyed, first by aerial photographers and then by skilled surveyors, so that any plan we might form might be fitted to the inevitable

conditions of the contours. Dr. Vevers and I spent all the time we could give in studying the ground in detail and in working out preliminary schemes.

As soon as the Bill was passed more active steps were taken. The erection of the boundary fence was put in hand, and although the work was delayed during winter, it is now practically completed. A gravel pit was opened and a staff of local men was set to work, clearing the woods, road-making and planting trees and shrubs. A reservoir to hold half a million gallons of water was constructed and pumping plant installed. Negotiations for a supply of electric current from Luton were begun, but have been delayed by the difficult question of adjusting the route by which the power cable is to come. As our intention is to avoid the use of houses as much as possible, allowing the animals free access to the open air at all times, we wish to be able to give them some heat in their open caves in very cold weather, and for that purpose electric heaters, controlled from a central station, are the only practical means. Electric power will also be required for the pumping plant, and to provide light and heating for the sanatorium department, as well as for the restaurant and keepers' cottages.

As soon as the more obvious of the walks and paddocks were mapped out, planting was begun, so that wherever possible the boundaries of the paddocks not accessible to the public should be plantations against the sky line. Eventually the fronts of the paddocks where they adjoin the avenues will be separated by deep barriers in the form of ditches, on the Mappin Terrace principle, but such engineering works will require time and money. The sites for the entrances were settled, and entrance lodges designed by Mr. E. Guy Dawber, A.R.A., who has taken a deep interest in the preservation of the local characters of country buildings. Mr. Dawber has also prepared plans for the transformation of the Hall Farm House

and buildings into refreshment rooms, with lawns and flower beds.

It will take a number of years and large sums of money to turn the property into a Zoological Park, and, more for purposes of description than as an accurate forecast, I have prepared a sketch plan of what in future years the arrangement may be. Certain of the main features are predetermined by the contours, and are already in process of being laid out; others seem probable at present, but my successors may find so many modifications necessary or desirable, that this plan may have as little reference to the future as was the case with the first plan designed by Decimus Burton for the London Gardens.

The plan shows four entrances, each called by a place name and each provided with a lodge and a motor park. The Icknield Gate, at the extreme north-west point, is so called because it lies only about a hundred yards from the Icknield Road, one of the ancient highways of England, running from Dunstable to Tring, and now transformed into an excellent, although rather narrow, modern road. The Whipsnade Gate, in the middle of the north-eastern boundary, lies nearest the village of Whipsnade, on a very old and rather rough road which skirts the boundary of the Society's property. The Studham Gate, in the middle of the eastern boundary, lies on the new right of way formed by the Society from the village of Whipsnade to the village of Studham; it must be the last to be built, for, until the right of way is transformed into a made public road, a change which must come with time, it gives no access to a road for vehicular traffic. But in future it is destined to be the most popular entrance as it is nearest to Watford and London.

The Dagnall Gate, in the middle of the south-western boundary, is nearest to the village of Dagnall. By the foresight and generosity of three Fellows of the Society, a strip of land 80 feet wide and nearly two-thirds of a

mile long, has been purchased and presented to the Society. It will form a magnificent approach avenue, winding up a valley at an easy gradient from the Dagnall-Studham public road to the Dagnall Gate.

From the Whipsnade Gate a high level circular avenue passes first due south with Wood Lawn Bird Sanctuary on the right, and Whipsnade Wood on the left, gives off on the right a roadway to the Curator's House and the Central Restaurant, until it reaches the edge of Cut-throat Wood, a sanctuary for British woodland flowers, where already there are wild daffodils, blue-bells, primroses and lilies of the valley. This portion, known as Central Avenue, is continued due south along the bottom of a dip towards the southern boundary. At the edge of the wood the circular avenue sweeps to the left until it joins the Dagnall Gate approach, at Holly Frindle Corner, after which it turns due north, as Escarpment Avenue, until it reaches the Duke's Beech, where it branches, the right-hand branch running north-east as the Duke's Avenue back to the Whipsnade Gate.

The branch to the left runs straight on, and then curves till it runs almost due north, as Observatory Road, to a service gate opening to the public Hill Road from Whipsnade to the Icknield Way, reaching the boundary fence, close to a little wood masking the reservoir and pumping station. Soon after it leaves the Duke's Avenue it gives off a road, Downs Road, descending the steep escarpment between the Icknield Lake (which has yet to be made) at the lowest point of the Society's property, and the steep slope of Bison Hill, on the right.

The eleven very large enclosures, marked P.P. 1 to P.P. 11 on the plan, have all been mapped out because they can be arranged with a background of plantation, either already in existence as grown wood, or planted recently, against the sky line. Where angles had to be rounded off, concealed small reserve paddocks (R. on

the plan) have been laid out, so as to make it possible to segregate breeding animals or individuals which are not agreeing with the rest of the occupants. The boundaries between these paddocks are also already planted with high hedges and trees, or are in process of being planted, and such fences as are necessary will be almost invisible against their backgrounds. Visitors following the Circular Route and the other main roads will therefore in every case be looking at the animals in a series of separate natural panoramas. The shelters for the animals will also be concealed from the front of the panoramas, but there will be access to them by hidden paths for service.

A winding footpath, leaving the Central Avenue nearly opposite the restaurant, twists through Wallaby Wood, in which kangaroos and wallabies will be at liberty, with, on the right, a view into two extremely well-protected " Inner Paddocks " in which creatures requiring complete shelter from the wind will find suitable abodes. This winding footpath crosses Whipsnade Wood to reach the Duke's Avenue. Immediately opposite it, across the Avenue there is being constructed at present a raised roadway, called Lady Yule's Walk, as Lady Yule, a Fellow of the Society, gave a donation of £1,000 towards the development of Whipsnade. This walk is separated by a very deep ditch, lined with concrete, from a large triangular paddock, enclosed on the other three sides by woods, which is to form the first home for bears. It is to be hoped that in future this system of barrier will be adopted largely, but the excavation, facing with concrete, and drainage, are expensive and in most cases we shall have to be content with fencing at first.

Lady Yule's Walk curves northwards to open into the Ousely Pond enclosure. This is a small natural pond surrounded by trees, and as it is almost at the highest point of the Park, the reservoir has been constructed behind it. The reservoir is half excavated and

half raised above the ground, the raised portion being covered with soil and grass and provided with steps and a small observatory seat looking over the pond.

The land to the south and west of Escarpment Avenue and Downs Road drops sharply, forming a very steep escarpment. At some future time a terrace avenue will have to be cut out of it, half-way between the Circular Route and the boundary fence. The face of escarpment on the upper or inner side of this will have to be quarried out into a series of sunny dens for large carnivores. The chalk comes to the surface and there will be no engineering difficulties, but the work will be costly. In several places there are already the beginnings of suitable dens, in the form of old chalk pits and some of these will probably be developed first. In the meantime, a footpath will be formed along the line of the future terrace, as it affords a charming view over the valley towards Ivinghoe. The beauty of the view can be seen at present where a cutting through Triangle Wood carried the line of the Duke's Avenue to the edge of the escarpment, and to the north-west of the same wood where a pavilion has been set up.

We hope that it will be possible, during 1929 and the winter of 1929–30, to have the Whipsnade Gate and the transformation of Hall Farm into a restaurant completed, the area inside the Central Avenue laid out and the chief paddocks stocked, so that Whipsnade Park may be opened to visitors by early summer next year. Although there will be only the beginnings of a menagerie, there will be enough to interest the public, and in any case there will be access to some of the most beautiful scenery and hill air near London. The Bird Sanctuary is already attracting wild birds, the woodland and down plants are already recovering from the disastrous pillaging to which they were subjected whilst the land was unprotected. There are beautiful trees, oaks, beeches, larches and pines, magnificent wild cherries, rose thickets, brambles and holly and gorse,

and, although we are planting for the future, every care is being taken to preserve the natural beauties.

The access by road from the London Gardens to Whipsnade is already so easy that we shall hope to use the new Park as a recuperating ground for all the animals that can be moved, and of these to show in London only creatures in the "pink" of condition. Gradually it may be found that, provided suitable barriers and shelters can be made at Whipsnade without spoiling the natural scenery and turning the new Park merely into a larger "Zoo" of the familiar type, many more different kinds of animals can be kept in the country than we contemplate at present. In any case, however, the larger carnivores, such as lions and tigers, bears and wolves, most of the antelopes, all kinds of deer, bison and wild cattle, camels and llamas, wild asses and zebras, can certainly be given almost natural quarters. Kangaroos and wallabies and many different kinds of rodents and insectivores will certainly succeed. There are at present on the land, foxes, badgers and stoats, as well as rabbits and hedgehogs, and a few red squirrels. How far it will be possible to preserve these under the new conditions without detriment to other stock I do not know. Some will have to be kept within bounds, as, if they succeed at all, they may succeed too well. Personally, I believe that much of the shyness of many of these native British animals is due to their age-long persecution by man, and I hope that under the new conditions we shall be able to win the confidence of some of these natives and leave them in undisturbed possession of parts of their old territory.

Apart from the British birds which we have already begun to encourage, there will be no difficulty in providing suitable conditions for ostriches, rheas and emus, cranes, storks, herons, bustards, all kinds of pheasants and game birds, and many kinds of water-fowl, as soon as we have lakes and ponds. The sheltered Ouseley

Pond already contains newts, and we shall hope to introduce common and edible frogs, hardy tree frogs from northern Belgium, and grass snakes.

On the other hand, so far as it is possible to foresee, the London Zoological Gardens are likely for an indefinite time to be the centre where the Society tries to exhibit the most representative range of the Animal Kingdom. We shall reduce the number of duplicates, and in building new houses and modifying those already in existence, of all the animals that can be shown at Whipsnade we shall show only a few specimens in London. Those animals requiring elaborate accommodation in the form of real houses, such as giraffes and elephants, rhinoceroses and hippopotamuses, the more delicate carnivores, and very many small animals, and probably most species of apes and monkeys, are likely to remain in London for an indefinite time. It may be possible in the future to enclose a sufficiently large area to keep baboons and the hardier species of macaques at Whipsnade, under reasonably natural conditions, but this would require, if completely wired-in enclosures are to be avoided, a Mappin Terrace ditch on a very large scale.

The more delicate exotic birds, especially those classed as " cage birds," and a representative series of parrots and parrakeets, and the Reptile House and Aquarium also certainly will remain in London.

So far as it is possible to foresee, the development of Whipsnade Park will provide a complement and not a rival to the London Zoo, and each will gain from the association, always provided that the aims of the two installations are kept separate. In London there will be a more representative display of the richness of the Animal Kingdom, smaller in the number of individuals of any species, much larger in the number of species exhibited. In the modern phrase, it will be a " close-up " of the animals exhibited, however the individual cages and compartments may be improved from their

present condition. I should expect the animals on the whole to be tamer, more accustomed to be fed and to come near to visitors. At Whipsnade the panoramas will be more distant, the animals under more natural conditions, probably less ready to come to the front and more concentrated on their own lives and occupations.

But I hope that in the future the Zoological Society will be more closely associated with a third mode of the study of living animals by which it may be possible for our fortunate successors to enjoy seeing wild life under completely natural conditions. We have given house-room and other assistance for some years to the Society for the Protection of the Wild Fauna of the Empire, which was initiated chiefly by Fellows of the Zoological Society and kept alive by some of us during the difficult time of the War. There are few parts of the world in which modern firearms, modern facilities for travel, the spread of civilisation, the extension of agriculture, as well as reckless methods of "sport" and ruthless commercial exploitation are not restricting the numbers and bringing danger even to the existence of wild animals. In 1912, in my Presidential Address to the Zoological Section of the British Association, I discussed this subject, and gave as one example out of many what had happened in the Transvaal since the Rand was opened in an area which only recently had supported a prodigious wild fauna. "Lions are nearly extinct. The hyæna has been trapped and shot and poisoned out of existence. The eland is extinct. The giraffe is extinct. The elephant is extinct. The rhinoceros is extinct. The buffalo is extinct. The bontebok, the red hartebeeste, the mountain zebra, the oribi and the grysbok are so rare as to be practically extinct." Since then some of the animals which were "very rare" are now extinct. Similar conditions are rapidly producing similar results over a large part of our Empire. There is only one sure way of preserving those species which still survive.

That way is the formation and maintenance of Reserves and Sanctuaries for wild animals. The Fauna Society devotes itself to collecting information on, and stimulating interest in, the preservation of wild animals directly in the British Empire and by co-operation with Societies of like purpose in other countries. It recognises that the one sure method is the sanctuary.

These Sanctuaries and Reserves, as I urged in 1912, should be not mere recuperating places for game, but are destined to become the finest Zoological Gardens of the future. Since the War there has been an increasing sense of responsibility amongst the nations which own territories still containing wild animals. In the United States of America, in Canada, in Australia and New Zealand, in the Union of South Africa, in Nyasaland, British East Africa, Uganda, the Sudan and Nigeria, reserves have been established and are being maintained with a struggle against the demands of settlers. The Congo Free State has recently created a magnificent reserve in the high volcanic region on the frontier of Uganda where, amongst other interesting creatures, gorillas are being absolutely protected. Zoological Societies all over the world should do their utmost to assist those who are striving to retain this already seriously reduced heritage from the past for the benefit of future generations. When the wild animals have learned that they are in sanctuary many of them will allow the presence of human visitors armed with camera and note-book and field glass. But I do not doubt but that in time protected stations will be established in the Reserves, in which, opposed to the usual custom in zoological gardens, the human visitors and not the animal inhabitants will be behind bars or protected by deep ditches. I foresee also the establishment of light and silent elevated electric railways, traversing the sanctuaries, and conveying visitors in safety from view point to view point. I foresee in the future of this and other Zoological Societies a linkage of the intimate City "Zoo," where the maximum

number of species will be shown with few individuals of each, the Country Park where the number of the species will be more limited and the number of individuals greater, and the Reserve, containing in a condition of absolute freedom only the animals proper to the country in which it has been formed.

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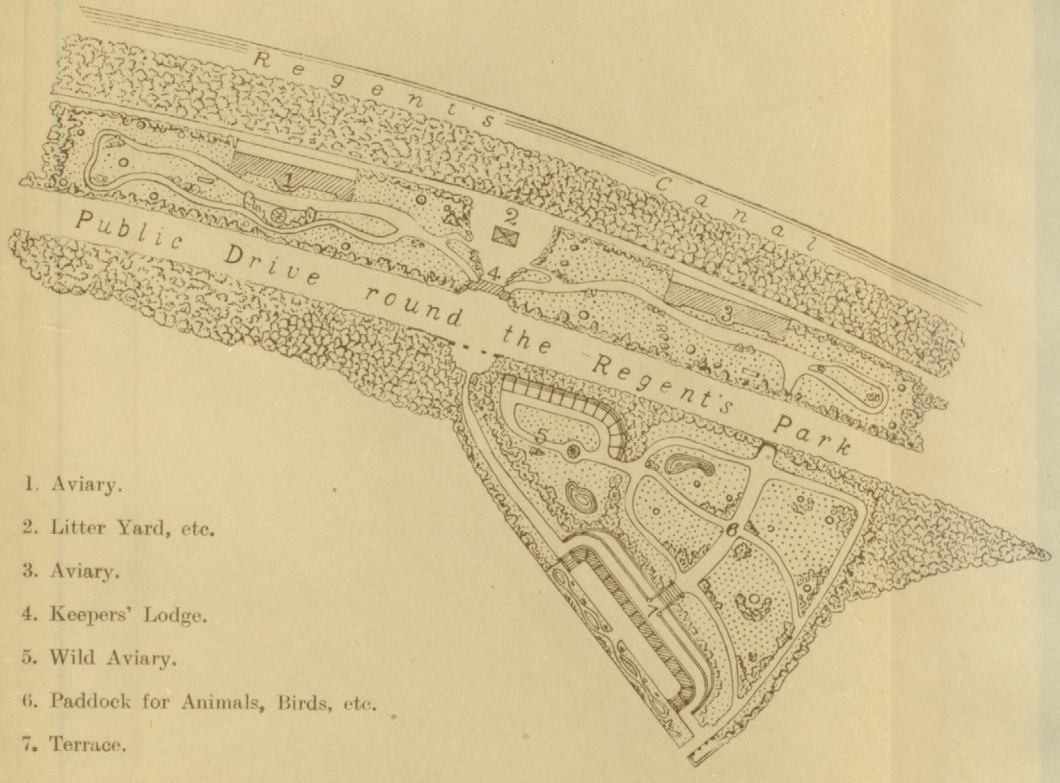
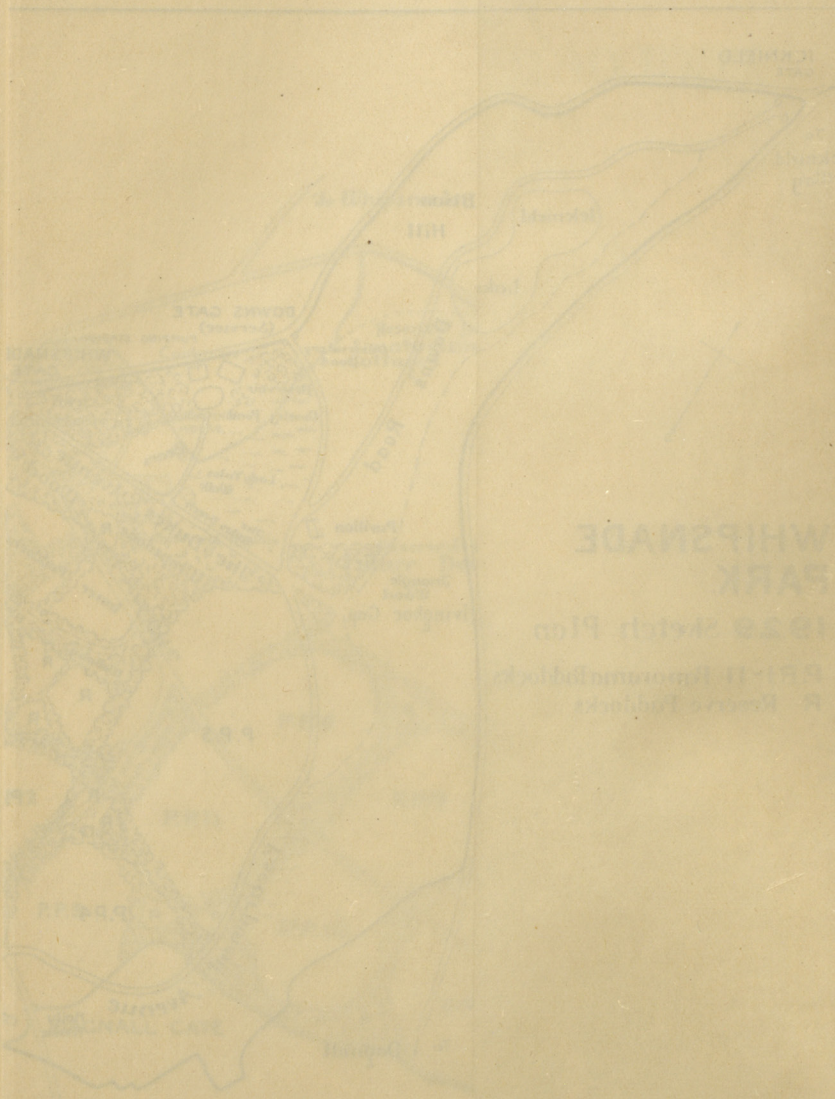


1. Aviary.
2. Litter Yard, etc.
3. Aviary.
4. Keepers' Lodge.
5. Wild Aviary.
6. Paddock for Animals, Birds, etc.
7. Terrace.



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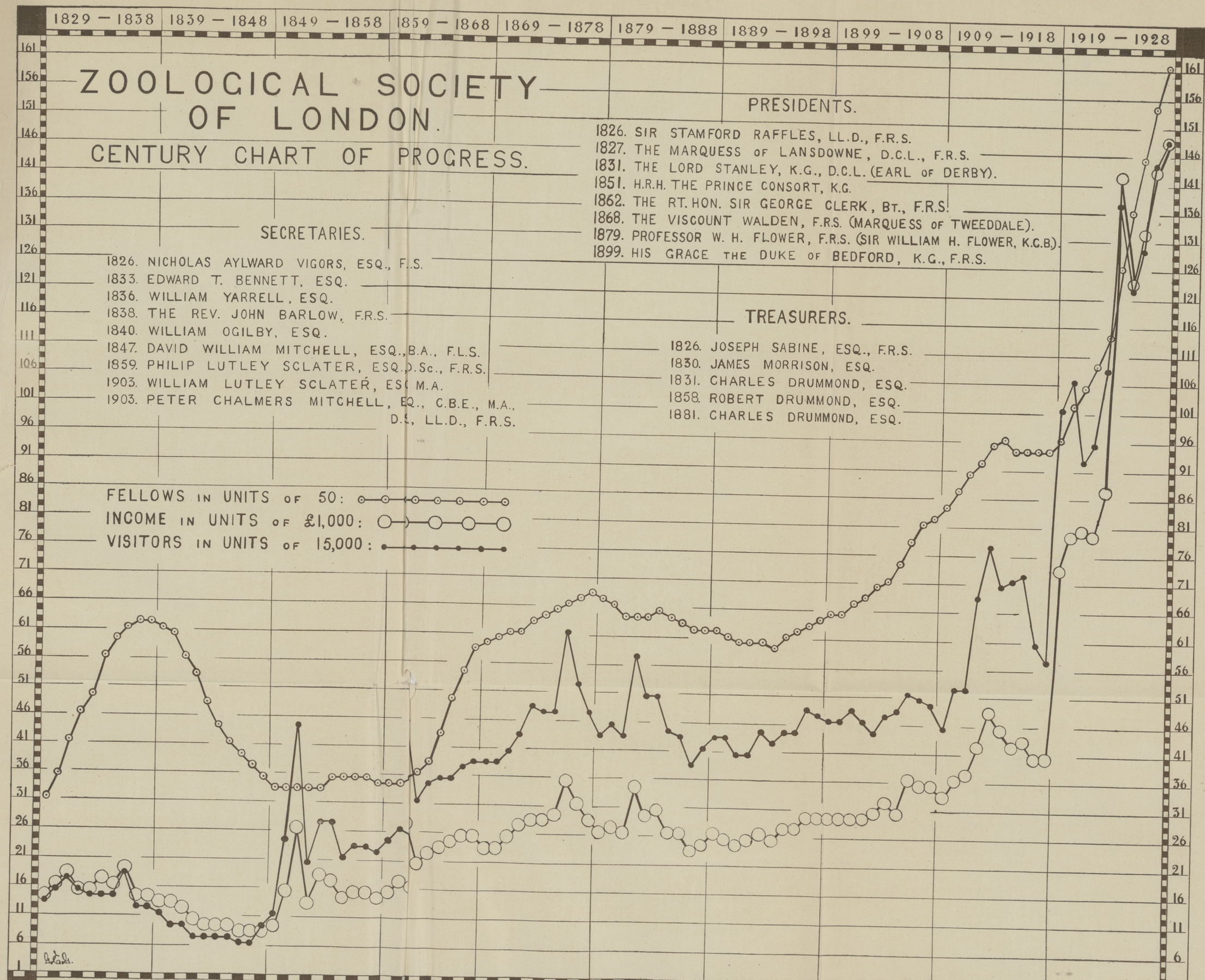

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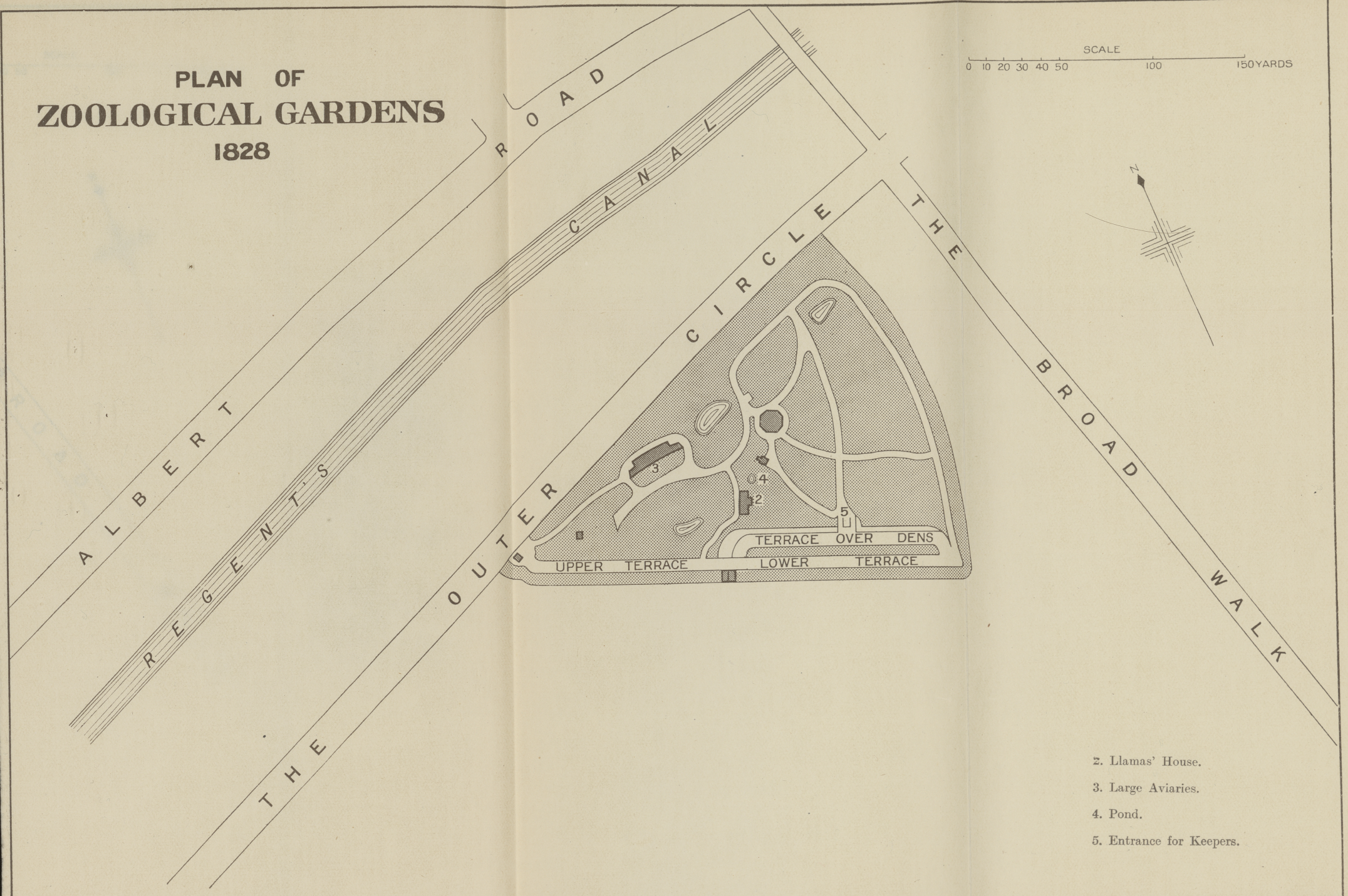
PLAN OF ZOOLOGICAL GARDENS 1828



2. Llamas' House.

3. Large Aviaries.

4. Pond.

5. Entrance for Keepers.

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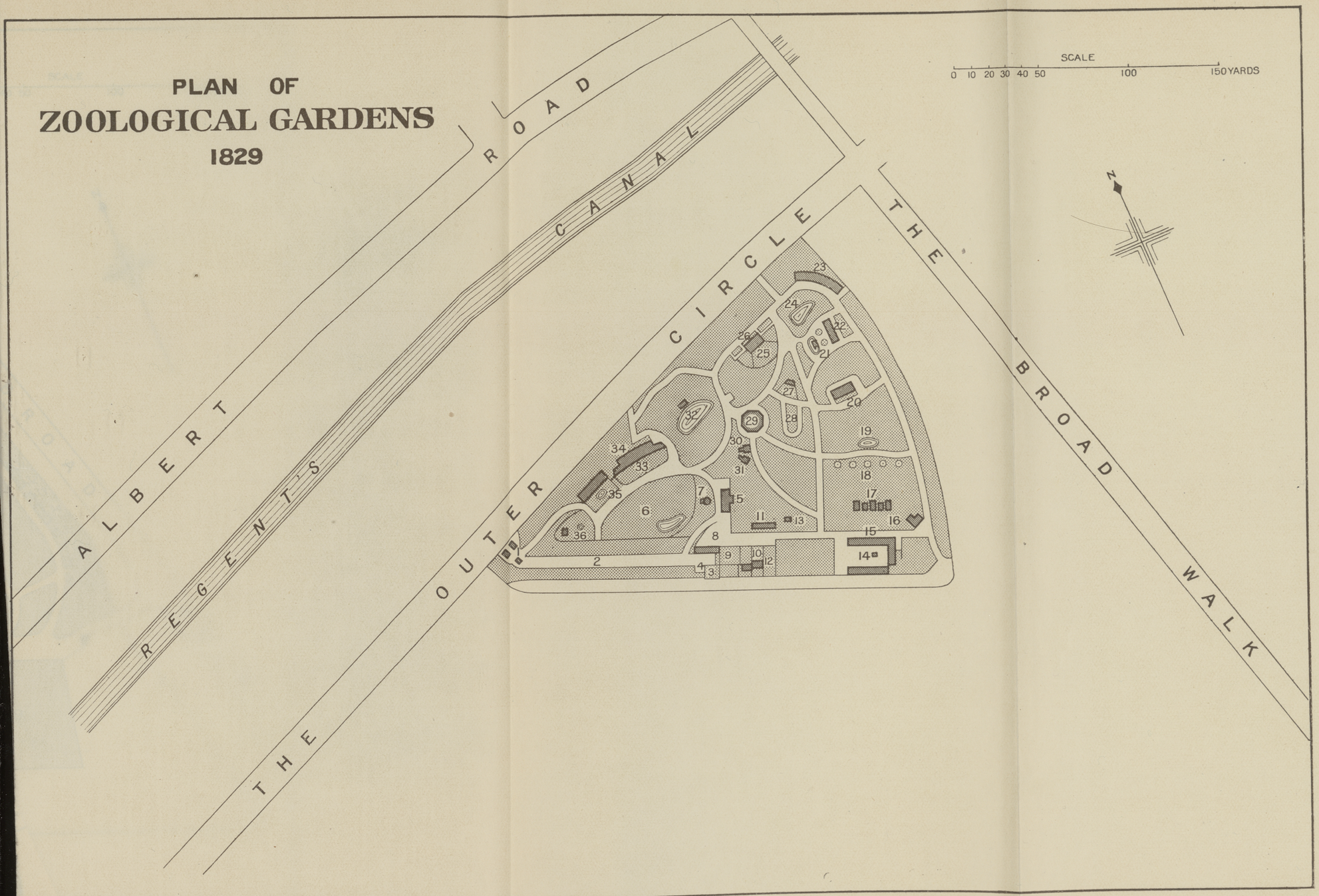
PLAN OF ZOOLOGICAL GARDENS 1829



Explanation of the Figures in 1829 Plan.

1. Entrance Lodge
2. Terrace
3. Bears' Pit
4. Rustic Seat
5. Llamas' House
6. Lawn and Pond
7. House and Cage for Macaws
8. Court Yard
9. Yards for Kangaroos, etc.
10. Yard and Shed for Deer
11. Dens for Large Quadrupeds
12. Floor of Repository
13. Shed and Enclosure for Goats
14. Carpenter's Yard, etc.
15. Dogs' and Foxes' Cages
16. Peccaries' Styes
17. Movable Aviaries
18. Monkey Poles
19. Otters' Cage and Pond
20. Monkey House
21. Beavers' House
22. Falcons' Aviary
23. Aviary for Small Birds
24. Pond for Small Ducks
25. Cow Shed and Yards
26. Owls' Cages
27. Turtle Doves' Cages
28. Enclosure for Rabbits
29. Eagles' Aviary
30. Guinea Pigs' Enclosure
31. Wolves' Den
32. Pond for Geese
33. Large Aviaries
34. Keepers' Apartments
35. Enclosure for Pelicans
36. Emus' House and Yard

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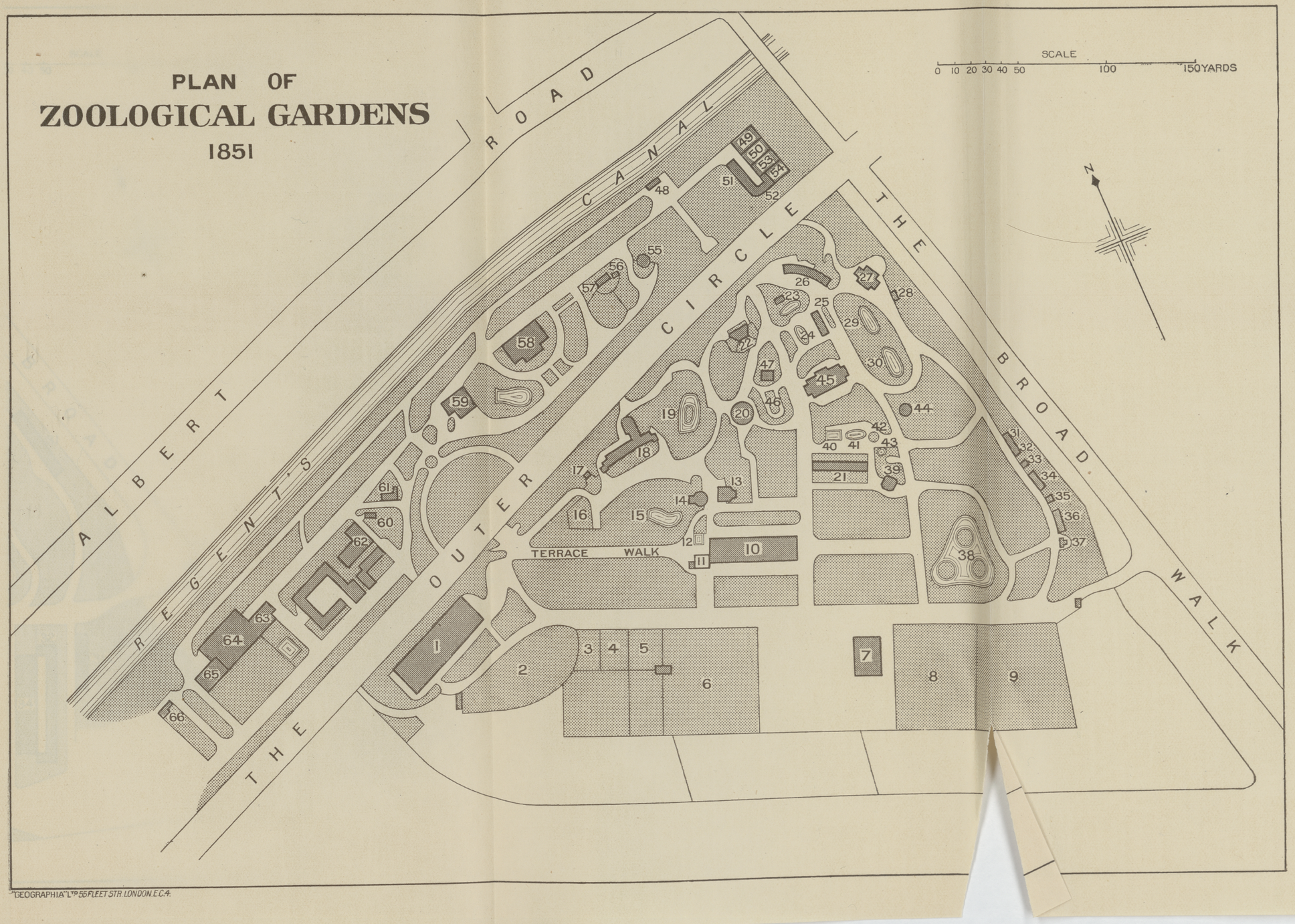
PLAN OF ZOOLOGICAL GARDENS 1851



Explanation of the Figures in 1851 Plan.

1. New Aviary
2. Crane Enclosure
3–6. Unfinished Enclosures
7. Mr. Gould's Humming Birds
8. Paddocks for Deer
9. Paddock for Zebus
10. Carnivora Terrace
11. Bear Pit
12. Polar Bear Pond
13. Clock House for Camels
14. Aviary for King Vulture
15. Lawn
16. Hut for Emu and Rhea
17. Hut for Sea Gulls
18. Old Aviary for Curassows, etc.
19. Pond for Ducks
20. Aviary for Owls and Falcons
21. Aviary for Eagles.
22. Hut for Bison, Warthog, etc.
23. Pond for Ducks
24. Seal Pond
25. Aviary
26. Aviary for Small Birds
27. Parrot House
28. Doves' Aviary
29. Pond for Ducks
30. Pond for Ducks
31–37. Dens for Small Carnivora
38. Three-island Pond
39. Condors' Aviary
40. Coypu Pond
41. Otters' Pond
42. Enclosure for Armadillos and Tortoises
43. Capybara Pond
44. Refreshment Room
45. Monkey House
46. Wombats' Enclosure
47. Doves' Aviary
48. Eagle Owls' Aviary
49. Reptile House
50–54. Sheds for Small Deer and Antelopes
55. House for Danta Bull.
56. Sambar Deer Hut
57. Barasingha Deer Hut
58. House for Wapiti, Zebras and Elephants
59. Elephant and Rhinoceros House
60. Tapir House
61. Hut for Peccaries
62. House for Small Quadrupeds
63–65. Giraffe, Ostrich and Hippopotamus House
66. Aurochs' House, Llamas and Alpacas.

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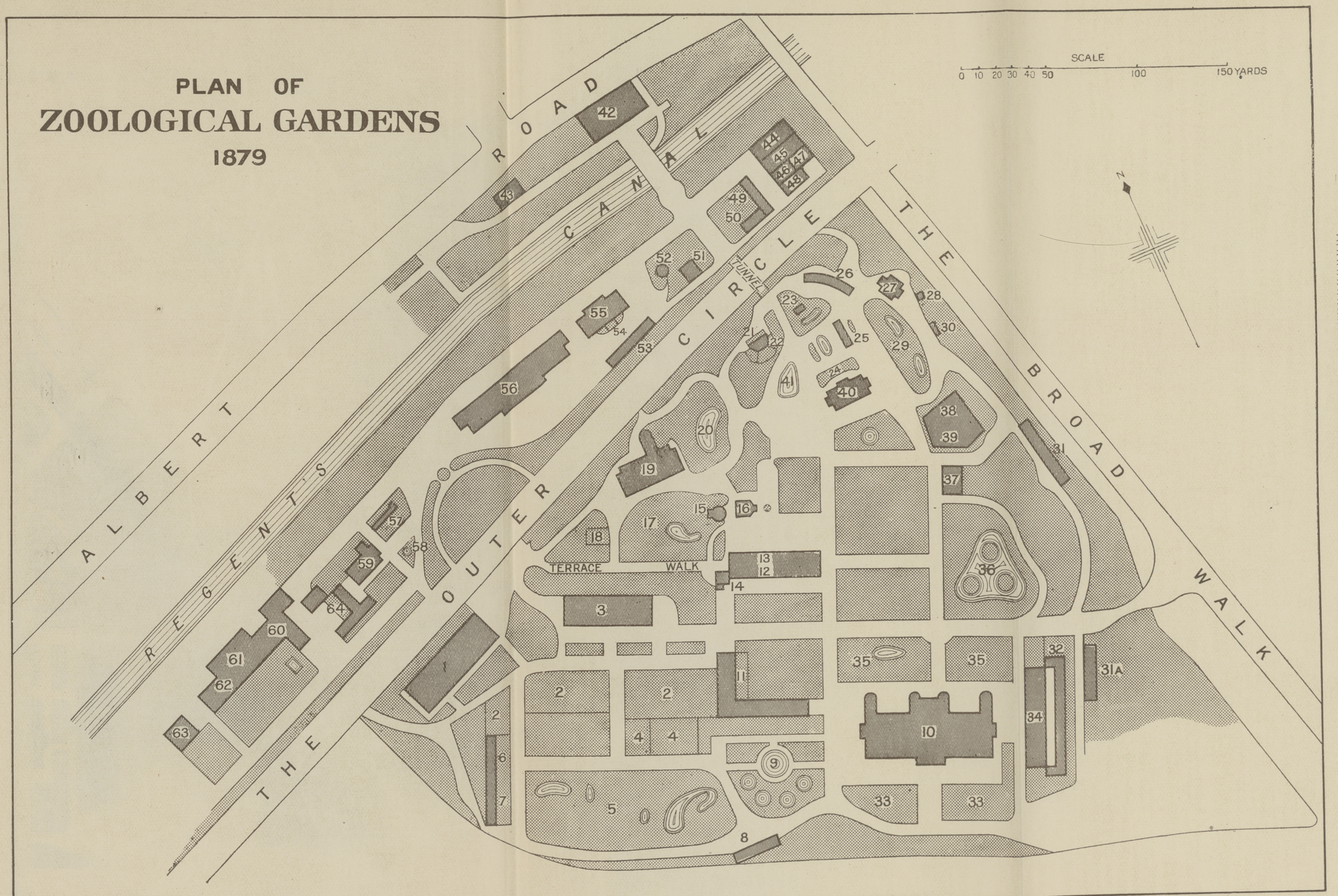
PLAN OF ZOOLOGICAL GARDENS 1879



Explanation of the Figures in 1879 Plan.

1. Western Aviary
2. Cranes and Storks
3. Monkey House
4. Emus' Sheds
5. Southern Ponds
6. Rodents' House
7. Swine House
8. Sheep Sheds
9. Seal Pond
10. Lion House
11. Antelope House
12. Hyænas' Dens
13. Bears' Dens
14. Bear Pit
15. Eagle Owls' Aviary
16. Camel House
17. Water Fowls' Lawn
18. Pelicans' Enclosure
19. Eastern Aviary
20. Northern Pond
21. Owls' Cages
22. Llamas' House
23. Mandarin Ducks' Pond
24. Otters' Cage
25. Kites' Aviary
26. Winter Aviary
27. Small Mammals' House
28. Pandas' House
29. Garganeys' Pond
30. Racoons' Cages
31. Vultures' Aviary
31A. Pheasants' House
32. Deer House
33. Goose Ponds
34. Cattle Sheds
35. Duck Ponds
36. Three Island Pond
37. Fish House
38. } Refreshment Rooms
39. }
40. Eagles' Aviaries
41. Rails' House
42. Northern Aviary
43. Tortoise House
44. Reptile House
45. Picture Gallery and Lecture Room
46. Marsupials' House
47. Sloths' House
48. } Kangaroo Sheds
49. }
50. Wombats' House
51. Brush Turkey's Enclosure
52. Markhors' House
53. Refreshment Stall
54. Crows' Cages
55. Parrot House
56. Elephant House
57. Deer Sheds
58. Beaver Pond
59. Superintendent's Office
60. Hippopotamus House
61. Giraffe House
62. Zebra House
63. Ostrich House
64. Gazelles' Sheds

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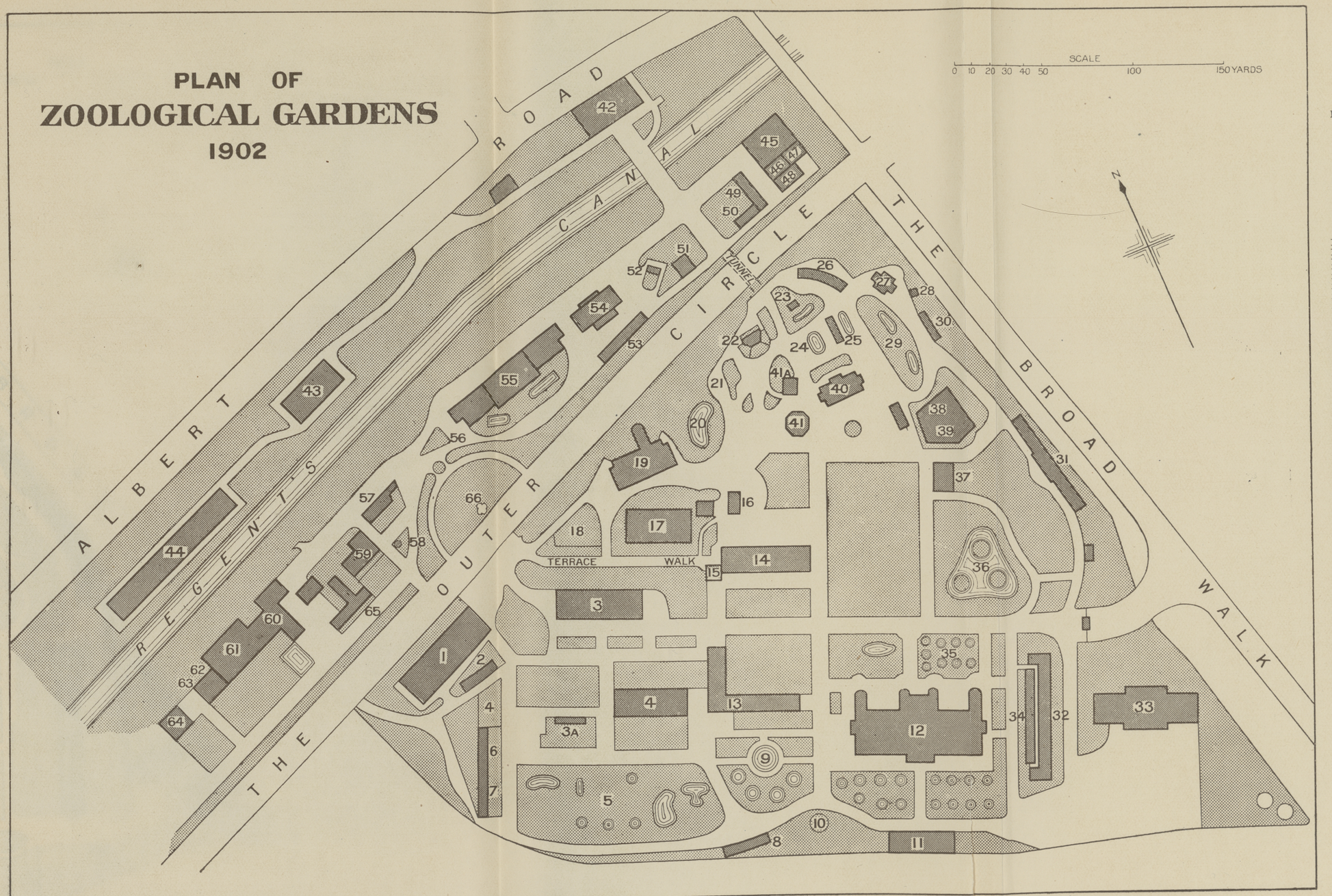
PLAN OF ZOOLOGICAL GARDENS 1902



Explanation of the Figures in 1902 Plan.

1. Western Aviary
2. Crows' Cages
3. Monkey House
3a. New Ape House
4. Crane and Ostrich House
5. Southern Ponds
6. Rodents' House
7. Swine House
8. Goat Yard
9. Sea-lions' Pond
10. Sheep Yard
11. Wolves' and Foxes' Dens
12. Lion House
13. Antelope House
14. Hyænas' and Bears' Dens
15. Bear Pit
16. Camel House
17. Great Aviary
18. Pelicans' Enclosure
19. Eastern Aviary
20. Northern Pond
21. Barbary Sheep Yard
22. Llamas' House
23. Mandarin Ducks' Pond
24. Otters' Cages
25. Kites' Aviary
26. Civets' House
27. } Small Mammals' Houses
28. }
29. Garganeys' Pond
30. Racoons' Cages
31. Vultures' Aviary
32. Wapiti House
33. Reptile House
34. Cattle Sheds
35. Duck Ponds
36. Three Island Pond
37. Fish House
38. } Refreshment Rooms
39. }
40. Eagles' Aviaries
41. Band Stand
42. Northern Aviary
43. Insect House
44. Northern Pheasantry
45. Small Cats' House
46. Ant-eaters' House
47. Sloths' House
48. } Kangaroo Sheds
49. }
50. Wombats' House
51. Brush Turkeys' Enclosure
52. Thars' House
53. Refreshment Stall
54. Parrot House
55. Elephant House
56. Moufflons' Yard
57. Deer Sheds
58. Beaver Pond
59. Superintendent's Office
60. Hippopotamus House
61. Giraffe House
62. Tapirs' House
63. Wild Asses' House
64. Zebra House
65. Gazelles' Sheds

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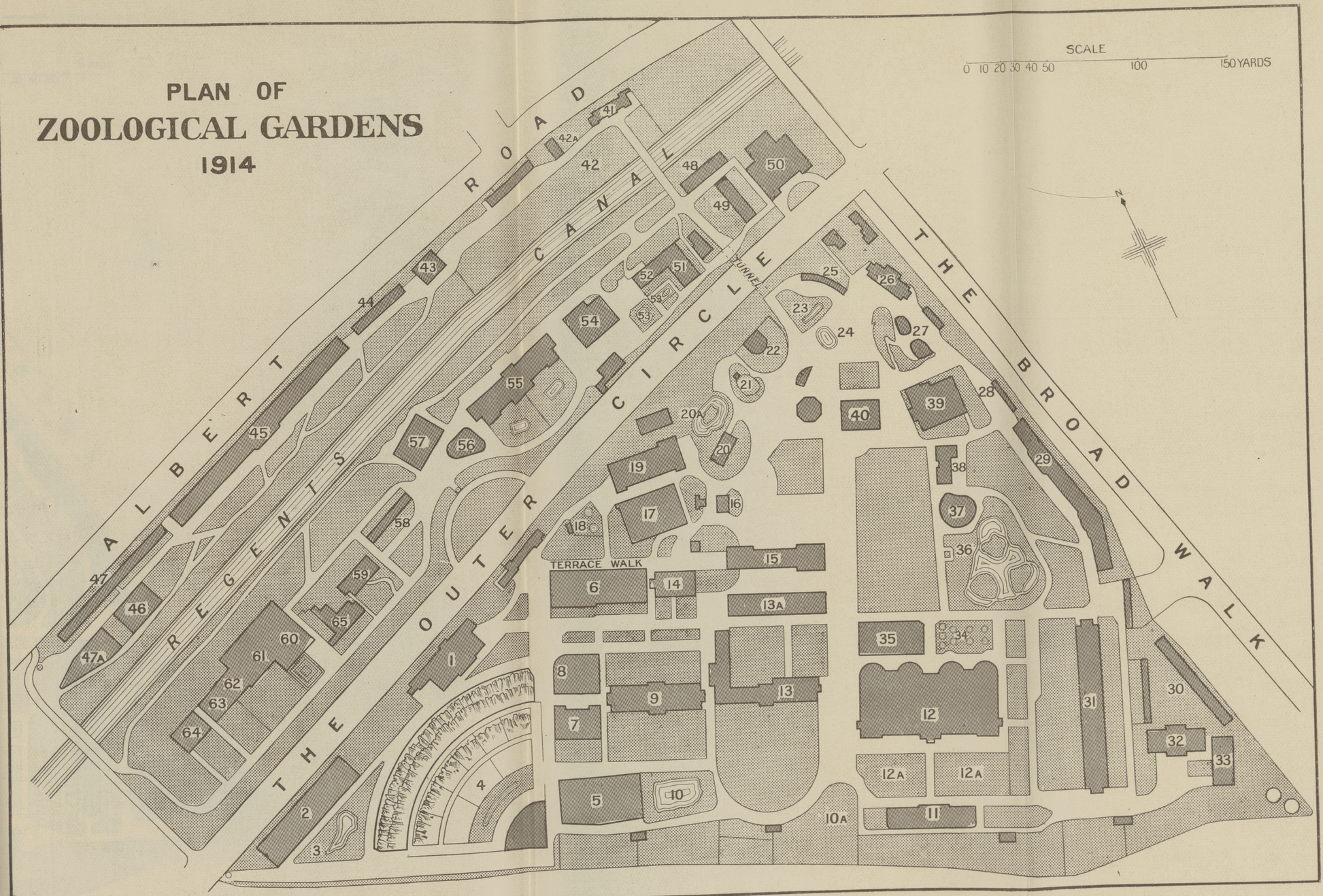

Explanation of the Figures in 1914 Plan

1. Western Aviary
2. Western Goose Paddocks
3. Western Duck Pond
4. Mappin Terraces
5. Southern Aviary
6. Monkey House
7. Ape House
8. Summer Aviary
9. Stork and Ostrich House
10. Sea Lions' Pond
10A. Park Paddocks
11. Wolves' and Foxes' Dens
12. Lion House
12A. Lion's House Paddocks
13. Antelope House
13A. The King's Cages
14. Small Birds' House
15. Hyænas' Dens
16. Camel House and Clock Tower
17. Great Aviary
18. Pelicans' Enclosure
19. Eastern Aviary
20. Fellows' Tea Pavilion
20A. Pavilion Pond
21. Sheep Yard
22. Llamas' House
23. Tunnel Pond
24. Otters' Pond
25. Crescent Aviary
26. Small Cats' House
27. Foxes' and Jackals' Enclosures
28. Racoons' Cages
29. Birds of Prey Aviaries
30. Sanatorium
31. Deer and Cattle House
32. Reptile House
33. Tortoise House
34. Duck Ponds
35. Waders' Aviary
36. Three Island Pond
37. Squirrels' Enclosure
38. Diving Birds' House
39. Refreshment Rooms
40. Band Stand, Tea Saloon and Terrace
41. Civets' House
42. Cranes' Paddocks
42A. Shoebill's House
43. Small Rodent's House
44. Owls' Aviary
45. Northern Pheasantry
46. Crows' Aviary
47. Lemur House
47A. Brush Turkeys' Enclosure
48. Mammals' Outdoor Cages
49. Kangaroos' Sheds and Paddocks
50. New Offices
51. Small Mammals' House
52. Caird Insect House
53. Coypu and Beavers' Ponds
54. Parrot House
55. Elephant House
56. Chamois Yard
57. Canal Bank Aviary
58. Deer Sheds
59. Superintendent's House
60. Hippopotamus House
61. Tapirs' House
62. Giraffe House
63. Wild Asses' House
64. Zebra House
65. Gazelle Sheds

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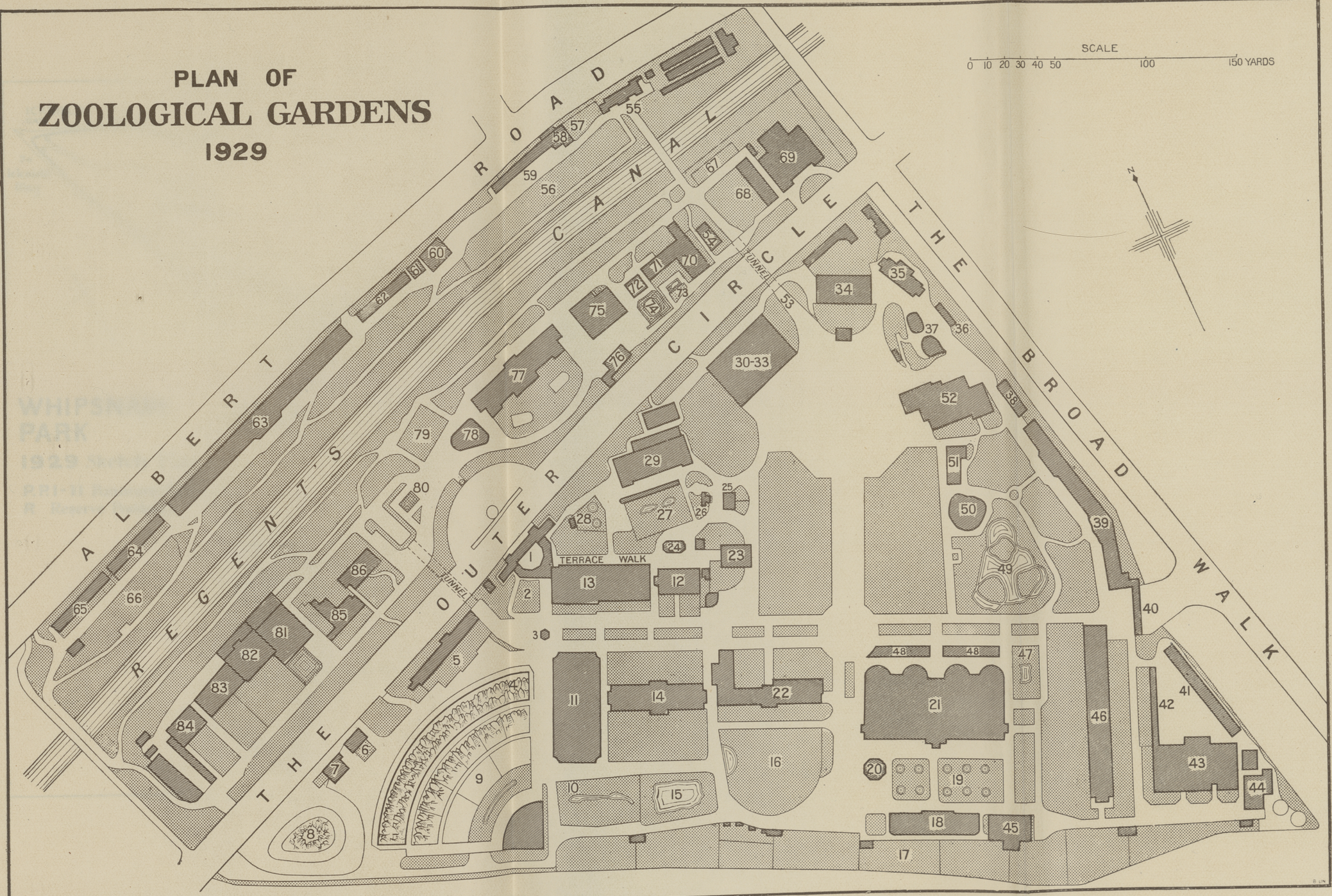

List of Houses, Enclosures, Etc.

Explanation of the Figures in 1929 Plan.

1. Main Gate and Entrance Court
2. Reptile Rock Garden
3. War Memorial
4. Aquarium
5. Western Aviary
6. Lemur House
7. Tapir House
8. Monkey Hill
9. Mappin Terraces
10. Southern Aviary
11. Reptile House
12. Tortoise House
13. Monkey House
14. Stork and Ostrich House
15. Sea-Lion Pond
16. Antelope Paddock
17. Park Paddocks
18. Wolves' and Foxes' Dens
19. Geese Paddocks
20. Racoons' Enclosure
21. Lion House
22. Antelope House
23. Terrace and Bears' Dens
24. Large Ape Cage
25. Camel House and Clock Tower
26. Ravens' Aviary
27. Great Aviary
28. Pelicans' Enclosure
29. Eastern Aviary
30–33. New Restaurant
34. Tea-House and Bandstand
35. Small Cats' House
36. Racoons' Cages
37. Foxes' and Jackals' Enclosures
38-39. Birds-of-Prey Aviaries
40. South Gate
41. Sanatorium and Prosectorium
42–43. Bird House and Aviaries
44. Tropical House
45. Popular Tea House
46. Deer and Cattle House
47. Waders' Aviary
48. Lion House Paddocks
49. Three Island Pond
50. Prairie Dogs' Enclosure
51. Diving Birds' House
52. Old Refreshment Rooms
53. Old Tunnel
54. Tunnel Bar
55. Civets' House
56–57. Crane Paddocks
58. Left Luggage Office
59. North Gate
60. Small Rodents' House
61. North Refreshment Stand
62. Owls' Aviary
63. Pheasantries
64–65. North Mammal House
66. Brush Turkeys' Enclosure
67. Lynx Cages
68. Kangaroo House and Paddock
69. Offices and Library
70. Small Mammal House
71. Caird Insect House
72. Butterflies' Cage
73. Coypu Pond
74. Beaver Pond
75. Parrot House
76. Elephant Bar
77. Elephant and Rhinoceros House
78. Sheep Yard
79. Canal Bank Aviary
80. Otters' Pond
81. Hippopotamus House
82. Giraffe House
83. Wild Asses' House
84. Zebra House
85. Gazelle Sheds
86. Curator's House

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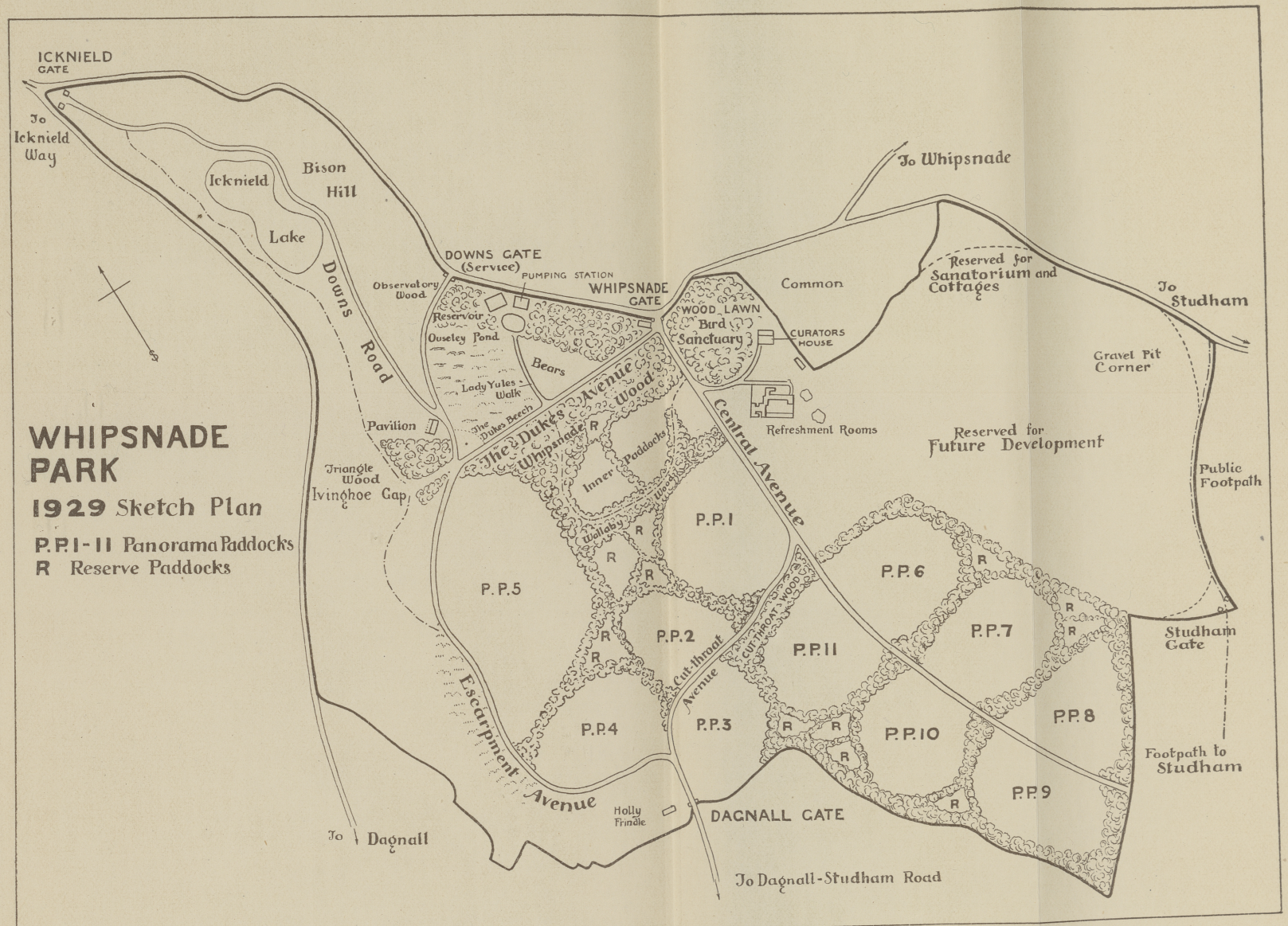
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Icknield
Bison Hill
Lake
Downs Road
DOWNS GATE (Service)
PUMPING STATION
Observatory Wood
WHIPSNADE GATE
Reservoir
Ouseley Pond
Bears
Lady Yules Walk
The Dukes Beech
Pavilion
Triangle Wood
Ivinghoe Gap
The Dukes Avenue
Whipsnade Wood
Inner Paddocks
Wallaby Wood
WOOD LAWN
Bird Sanctuary
CURATORS HOUSE
Common
To Whipsnade
Reserved for Sanatorium and Cottages
To Studham
Gravel Pit Corner
Refreshment Rooms
Reserved for Future Development
Central Avenue
Public Footpath
WHIPSNADE PARK
1929 Sketch Plan
P.P.1-11 Panorama Paddocks
R Reserve Paddocks
P.P.1
P.P.2
P.P.3
P.P.4
P.P.5
P.P.6
P.P.7
P.P.8
P.P.9
P.P.10
P.P.11
R
Cut-throat Wood
Cut-throat Avenue
Escarpment Avenue
Holly Firidle
DAGNALL GATE
To Dagnall
To Dagnall-Studham Road
Studham Gate
Footpath to Studham